

IDAHO DEPARTMENT OF FISH AND GAME

FEDERAL AID IN SPORT FISH RESTORATION
1995 Job Performance Report
F-71-R-20



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS SOUTHWEST REGION (McCALL) (Subprojects I-C, II-C)

- Project I. SURVEYS AND INVENTORIES
 - Job a. McCall Subregion Mountain Lakes Investigations
 - Job b. McCall Subregion Lowland Lakes Investigations
 - Job c. McCall Subregion Rivers and Streams Investigations
 - Job d. McCall Subregion Salmon and Steelhead Investigations
- Project II. TECHNICAL GUIDANCE

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Don Anderson, Regional Fishery Manager

IDFG Report 00-07

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1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project I: Surveys and Inventories

Subproject I-C: Southwest Region (McCall)

Job: a

Title: Mountain Lakes Investigations

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

In a cooperative project with the U.S. Forest Service, 20 mountain lakes were surveyed in 1995 to assess fish population status, past stocking strategies, and/or physical habitat parameters.

We collected no fish in Sisters (south) Lake. We collected rainbow trout *Oncorhynchus mykiss* from Cooks, West Duck, Josephine, Shaw Twin (upper and lower), and Crystal Lakes. We collected brook trout *Salvelinus fontinalis* from Loon, Sisters (north), Serene, Upper Hazard, Hard Creek, and Paradise Lakes. We collected westslope cutthroat trout *O. clarki lewisi* from Lake Rock, Shaw Twin (upper and lower), West Duck, Josephine, Morgan, Coffee Cup, and Serene Lakes. We collected bull trout *S. confluentus* from Loon Lake and Disappointment Lake. We also found suckers *Catostomus* sp. in Loon Lake and Coffee Cup Lake.

Authors:

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Don Anderson
Regional Fishery Manager

OBJECTIVES

1. Evaluate fisheries management techniques in alpine lakes.
2. Identify problems and/or opportunities in lakes that currently are not being directly managed.

INTRODUCTION

The Idaho Department of Fish and Game (IDFG) entered into a cooperative project with the United States Forest Service's (USFS), Payette National Forest (PNF) in 1989, to assess fish population status, physical habitat parameters, and past stocking strategies in a selected number of alpine lakes. This program was continued through 1995. Idaho Department of Fish and Game and PNF personnel worked cooperatively to collect the data used in this report. A more detailed habitat survey report will be written by the USFS. Past data collected from this project was presented by Weaver (1992, 1994), Janssen and Anderson (1994) and Janssen et al. (1994). This years habitat data collected by the PNF will be presented in a USFS report.

A total of 20 alpine lakes were examined in 1995 by USFS and IDFG personnel.

METHODS

Fish population status in each lake was determined by collecting fish with gill nets. Typically, one 150-foot experimental diving gill net was set perpendicular to the shore. The nets were set in the evening and pulled the next morning. All fish collected were weighed in grams and measured recording total length in millimeters.

Physical and chemical habitat parameters were measured on several lakes and the results and techniques used by USFS personnel were described in Weaver (1992 and 1994). Idaho Department of Fish and Game personnel used the IDFG standard mountain lake survey forms on lakes where they completed surveys.

RESULTS

We examined a total of 20 mountain lakes in 1995. Fish populations were examined in 16 of the 20. Results of the fish sampling efforts are presented in Table 1.

Paradise Lake (07-210) and Loon Lake (07-387) had both been stocked with rainbow trout *Oncorhynchus mykiss* but none were collected in gill nets. We found large numbers of 7- to 10-inch brook trout *Salvelinus fontinalis* with low relative weights in Paradise Lake. We collected bull trout *Salvelinus confluentus*, brook trout, whitefish *Prosopium williamsoni*, and small suckers *Catostomus sp.* in Loon lake.

We sampled five lakes that contained large numbers of small brook trout with low relative weights. No fish were found in Sisters (south) Lake (09-372).

Idaho Department of Fish and Game personnel completed habitat surveys on four mountain lakes. Results are given in the appendices.

Table 1. Total number and average condition factors (Ktl) or relative weights (Wr) by length group of each species of fish sampled in mountain lakes in 1995.

Lake	Cat No.	Species Ktl Wr	Total Length (inches)														
			4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Morgan	07-155	wsc ^a										1	1				
		Ktl										0.78	0.84				
Coffee Cup	07-157	wsc					1		4								
		Ktl					0.88		0.83								
		sucker	2 suckers, 450mm-2000g														
Disappointment	07-158	bull ^b									2	4					
		Ktl									0.95	0.96					
Serene	07-159	brk ^c		1	2			1			1	1					
		Wr		55.9	75.3			70.8			70.4	71.9					
		wsc								2	2						

Table 1. Continued

Lake	Cat No.	Species Ktl Wr	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Ktl								0.94	0.93						
Upper Hazard	07-170	brk	1	1		6	10	20	2								
		Wr				63.8	61.1	61.0	59.4								
Hard Creek	07-173	brk		1				1	6	3	1		1				
		Wr						79.3	80.5	74.9	74.4		69.3				
Paradise	07-210	brk			3	12	24	4									
		Wr			85.0	79.7	73.3	71.2									
Cooks	07-278	rbr ^d	7						1								
		Ktl							1.0								
West Duck	07-366	rbr					1										
		Ktl					0.86										
		rbr/ctt									1						

Table 1. Continued

Lake	Cat No.	Species Ktl Wr	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Ktl									0.84						
		wsc							1					1			
		Ktl							1.07					1.13			
Loon	07-387	bull			1	1	1				2	4	1			1	2
		Ktl			0.85	0.71	0.88				0.90	0.87	0.66			1.0	0.73
		brk	7	6	9	11	2	3	3	1	2		1	1		1	
		Wr	62.2	47.6	81.9	70.0	75.5	65.8	74.3	65.0	79.0		45.1	63.0		62.3	
		mwf ^e	2	1	3	5	2		4	4	4	3	4	1			
		sucker	5	Unknown species													
Josephine	07-408	rbt	1		2			1	7	4	5	1					
		Ktl	0.66		1.01			0.97	0.94	0.86	0.77	0.83					
		wsc					3	3	1								
		Ktl					1.01	0.87	0.62								

^a westslope cutthroat trout^b bull trout^c brook trout^d rainbow trout^e mountain whitefish

Table 1. Continued

Lake	Cat No.	Species Ktl Wr	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Lake Rock	07-409	wsc							1	2						1	
		Ktl							0.94	0.84						na	
Shaw Twin Upper	09-331	rbt						1	8	1							
		Ktl						0.83	0.99	1.00							
		wsc			1	1					2						
		Ktl			1.03	1.01					0.95						
Shaw Twin lower	09-332	rbt			1	1	2	1			5	3		1			
		Ktl			0.83	0.83	0.99	0.81			0.75	0.61		0.77			
		wsc				1	5	3		1							
		ktl				0.87	0.82	0.82		na							
Crystal	09-351	rbt										1					
		Ktl										0.87					

Table 1. Continued

Lake	Cat No.	Species Ktl Wr	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Sisters (north)	09-371	brk	Not netted but many brook trout of several ages observed														
Sisters (south)	09-372	none	No fish collected in gill nets fished overnight														
Box	09-377	brk	1		2	6	15	16	19	7	1						
		Wr			85.2	79.4	80.6	75.3	64.8	67.1	57.3						

RECOMMENDATIONS

1. Discontinue stocking Loon Lake and Paradise Lake.
2. Continue to monitor fish populations in high mountain lakes in the region and make appropriate management changes.
3. Continue to monitor lakes and store data in the IDFG mountain lakes data base.
4. Continue working with the Payette National Forest personnel collecting baseline fishery and habitat data in high mountain lakes.

LITERATURE CITED

- Janssen, P.J., and Anderson D.R. 1994. Regional fishery management investigations. Federal aid in fish restoration. Job performance report, Project F-71-R-16. Idaho Department of Fish and Game, Boise.
- Janssen, P.J., D.R. Anderson and J. Patterson. 1994. Regional fishery management investigations. Federal Aid in Fish Restoration. Job performance report, Project F-71-R-17. Idaho Department of Fish and Game, Boise.
- Weaver, P. 1992. Payette National Forest, High mountain lakes survey, 1989-1990. Payette National Forest. McCall, Idaho.
- Weaver, P. 1994. Payette National Forest, High mountain lakes survey, Vol. 2: 1992-93. Payette National Forest. McCall, Idaho.

APPENDICES

Idaho Fish and Game
Mountain Lake Survey Form

LAKE NAME: Morgan Lake DATE: 07-25-95
IDFG CATALOG #: 0 9: _ _ : _ _ _ : 0 1 5 5 EPA #: _____
MAJOR DRAINAGE: Little Salmon River
MINOR DRAINAGE: Hazard Creek
COUNTY: Idaho REGION: S.W. Region
USFS RANGER DIST: _____
WILDERNESS AREA: _____
SECTION: _____ TWSHP: _____ RANGE: _____ ELEVATION: 6200 Feet

PHYSICAL:

LAKE TYPE: 1 1.cirque 2.moraine 3.slump 4.caldera 5.beaver
TOTAL SURFACE AREA: 1.7 Hectares (4.1 acres)
DEPTH PROFILE: 1 ASPECT: 1
1. deep (75% of lake >6m deep) 1. Lake has north facing exposure
2. moderate (50% of lake >6m deep) 2. Lake has south facing exposure
3. shallow (25% of lake >6m deep) 3. Lake has east facing exposure
MAXIMUM DEPTH: _____ meters 4. Lake has west facing exposure
AVERAGE DEPTH: _____ meters 5. Lake is exposed in all directions

CHEMICAL

Alkalinity _____ Mg/l pH _____
Conductance 43.3 umho/cm² @ 25C Temp (surface) 59.0 F
Secchi depth _____ meters Temp (bottom) _____ C

SPAWNING POTENTIAL

INLET(S) 1 (number) OUTLET(S) 1 (number)
LENGTH ACCESSABLE FOR SPAWNING LENGTH ACCESSABLE FOR SPAWNING
5 meters 5 meters
INLET SPAWNING SUITABILITY: 3 OUTLET SPAWNING SUITABILITY: 3
1.Excellent (abundant)
2.Adequate (enough to maintain suitable spawning population)
3.Fair (not adequate to maintain population)
4.Poor (not suitable for successful spawning)

USE:

CAMPSITES 3 (number) FIRE PITS 3 (number) LITTER (L) M H
TRAIL AROUND LAKE: _____ complete X partial, trampled: (YES) NO
ACCESS: X good trail _____ poor trail _____ cross country

BIOLOGICAL:

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density (o/l)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Appendix A. Continued.

INSECT COMPOSITION AND ABUNDANCE

Aquatic Genera	Relative Abundance			Terrestrial Genera	Relative Abundance		
Mosq	L	(M)	H	Grasshoppers	L	(M)	H
Striders	L	M	(H)	Ants	L	(M)	H
	L	M	H		L	M	H

FISH SURVEY (Gill netted overnight)

FISHERMEN 0 (numbers)

HOURS FISHED (total)

FISH CAUGHT 0 FISH/HOUR Abundance L M H

LENGTH FREQUENCY

Total Length in mm

SPECIES	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
CUT							1	1	
TOTAL	0	0	0	0	0	0	1	1	0

FISH CONDITION

SPECIES	TOTAL LENGTH (mm)		WEIGHT (g)		CONDITION (K)	
	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE
CUT	361	345-377	385	320-450		

STOCKING HISTORY

YEAR	SPECIES	NUMBER OF FISH	COMMENTS
1992	C2	1000	
1995	C2	1000	

COMMENTS:

This is a detailed topographic map of the Gross Mountains area in Montana. The map features numerous contour lines indicating elevation, with labels such as 6000, 7000, 8000, and 9000 feet. Key geographical features include Gross Mountain, Gross Mountain Lake, and several smaller lakes and ponds. The map is overlaid with a grid system, with coordinates marked along the edges. The title 'GROSS MOUNTAINS' is prominently displayed in the upper right corner. The map is oriented with North at the top.

Appendix B. Dissappointment Lake survey data forms.

Idaho Fish and Game
Mountain Lake Survey Form

LAKE NAME: Dissappointment Lake DATE: 07-26-95
IDFG CATALOG #: 0 7: _ _ : _ _ : 0 1 5 8 EPA #: _____
MAJOR DRAINAGE Little Salmon River
MINOR DRAINAGE: Hazard Creek
COUNTY: Idaho REGION: S.W. Region
USFS RANGER DIST: _____
WILDERNESS AREA: _____
SECTION: _____ TWSHP: _____ RANGE: _____ ELEVATION: 6865 Feet

PHYSICAL:

LAKE TYPE: 2 1.cirque 2.moraine 3.slump 4.caldera 5.beaver
TOTAL SURFACE AREA: _____ Hectares
DEPTH PROFILE: 1 ASPECT: 1
1. deep (75% of lake >6m deep) 1. Lake has north facing exposure
2. moderate (50% of lake >6m deep) 2. Lake has south facing exposure
3. shallow (25% of lake >6m deep) 3. Lake has east facing exposure
MAXIMUM DEPTH: _____ meters 4. Lake has west facing exposure
AVERAGE DEPTH: _____ meters 5. Lake is exposed in all directions

CHEMICAL

Alkalinity _____ Mg/l pH _____
Conductance _____ umho/cm² @ 25C Temp (surface) _____ C
Secchi depth _____ meters Temp (bottom) _____ C

SPAWNING POTENTIAL

INLET(S) 2 (number) OUTLET(S) 2 (number)
LENGTH ACCESSABLE FOR SPAWNING LENGTH ACCESSABLE FOR SPAWNING
N/A meters N/A meters
INLET SPAWNING SUITABILITY: 2 OUTLET SPAWNING SUITABILITY: 2
1.Excellent (abundant)
2.Adequate (enough to maintain suitable spawning population)
3.Fair (not adequate to maintain population)
4.Poor (not suitable for successful spawning)

USE:

CAMPSITES 0 (number) FIRE PITS 0 (number) LITTER (L) M H
TRAIL AROUND LAKE: _____ complete X partial, trampled: YES (NO)
ACCESS: X good trail _____ poor trail _____ cross country

BIOLOGICAL:

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density (o/l)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Appendix B. Continued.

INSECT COMPOSITION AND ABUNDANCE

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
Caddis	L (M) H	Grasshopper	(L) M H
Mosq	L M (H)		L M H
Stone	L M (H)		L M H

FISH SURVEY (Gill netted overnight)

FISHERMEN 0 (numbers) HOURS FISHED _____ (total)

FISH CAUGHT 0 FISH/HOUR _____ Abundance L M H

LENGTH FREQUENCY

Total Length in mm

SPECIES	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
BLT							6		
TOTAL	0	0	0	0	0	0	6	0	0

FISH CONDITION

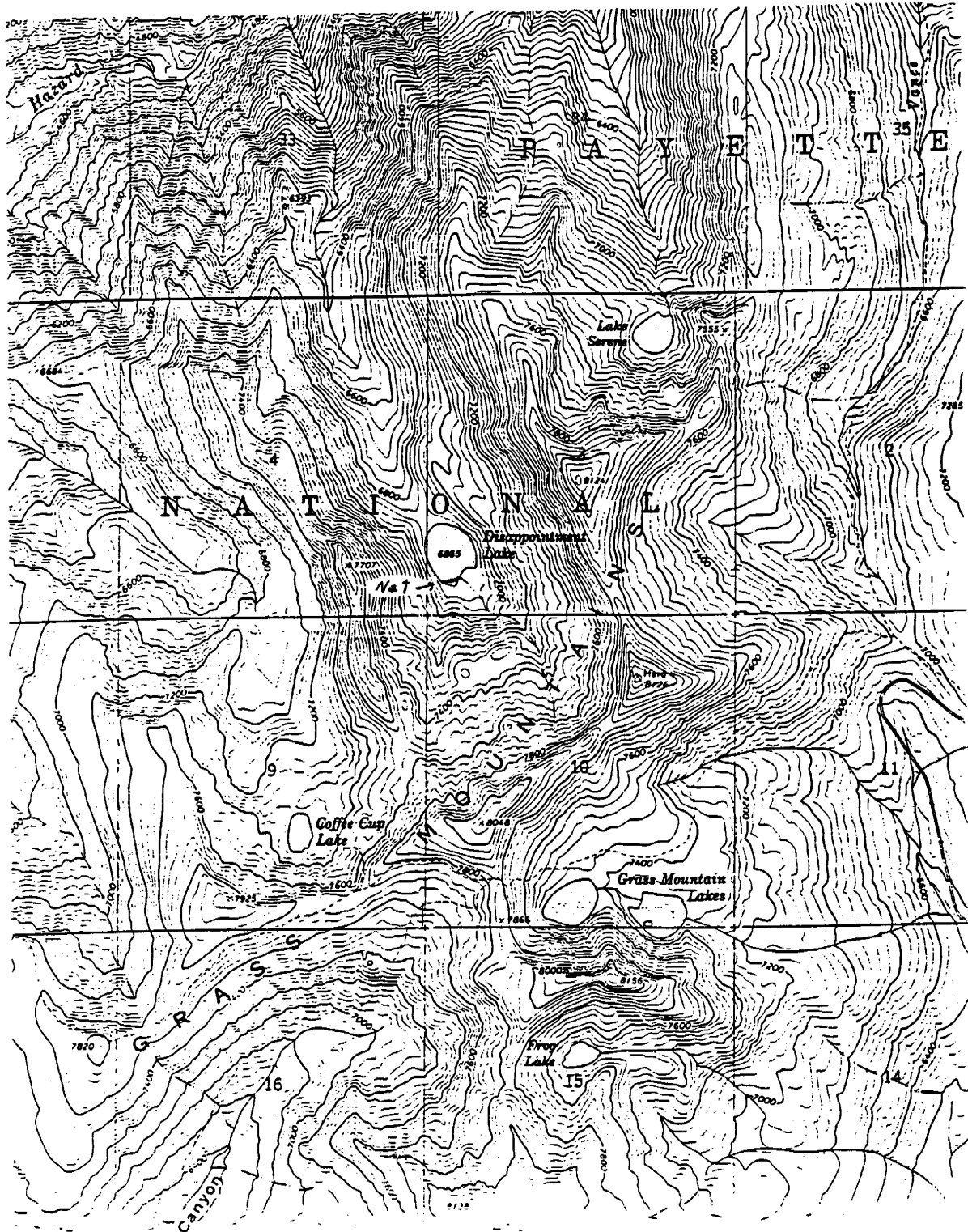
SPECIES	TOTAL LENGTH (mm)		WEIGHT (g)		CONDITION (K)	
	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE
BLT	332.2	320-348	353.3	295-395		

STOCKING HISTORY

YEAR	SPECIES	NUMBER OF FISH	COMMENTS
1992	bull	200	14.0/lb. Brook trout rotenoned in 1991.

COMMENTS:

Appendix B. Continued.



Appendix C. Coffee Cup Lake survey data forms

Idaho Fish and Game
Mountain Lake Survey Form

LAKE NAME: Coffee Cup Lake DATE: 07-24-95
IDFG CATALOG #: 07:--:--:0157 EPA #: _____
MAJOR DRAINAGE: Little Salmon River
MINOR DRAINAGE: Hazard Creek
COUNTY: Idaho REGION: S.W. Region
USFS RANGER DIST: _____
WILDERNESS AREA: _____
SECTION: _____ TOWNSHIP: _____ RANGE: _____ ELEVATION: 7300 Feet

PHYSICAL:

LAKE TYPE: 2 1.cirque 2.moraine 3.slump 4.caldera 5.beaver
TOTAL SURFACE AREA: 3.3 Hectares (5.7 acres)
DEPTH PROFILE: 2 ASPECT: 1
1. deep (75% of lake >6m deep) 1. Lake has north facing exposure
2. moderate (50% of lake >6m deep) 2. Lake has south facing exposure
3. shallow (25% of lake >6m deep) 3. Lake has east facing exposure
MAXIMUM DEPTH: _____ meters 4. Lake has west facing exposure
AVERAGE DEPTH: _____ meters 5. Lake is exposed in all directions

CHEMICAL

Alkalinity _____ Mg/l pH _____
Conductance 45 umho/cm² @ 25C Temp (surface) 58.0 F
Secchi depth _____ meters Temp (bottom) _____ C

SPAWNING POTENTIAL

INLET(S) 2 (number) OUTLET(S) 1 (number)
LENGTH ACCESSABLE FOR SPAWNING LENGTH ACCESSABLE FOR SPAWNING
3 meters 5 meters
INLET SPAWNING SUITABILITY: 4 OUTLET SPAWNING SUITABILITY: 3
1.Excellent (abundant)
2.Adequate (enough to maintain suitable spawning population)
3.Fair (not adequate to maintain population)
4.Poor (not suitable for successful spawning)

USE:

CAMPSITES 3 (number) FIRE PITS 3 (number) LITTER (L) M H
TRAIL AROUND LAKE: _____ complete X partial, trampled: (YES) NO
ACCESS: X good trail _____ poor trail _____ cross country

BIOLOGICAL:

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density (o/l)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Appendix C. Continued.

INSECT COMPOSITION AND ABUNDANCE

Aquatic Genera	Relative Abundance			Terrestrial Genera	Relative Abundance		
Mosq	L	M	(H)	Grasshoppers	L	(M)	H
Mavfly	L	(M)	H	Ants	L	(M)	H
Striders	L	(M)	H		L	M	H

FISH SURVEY (Gill netted overnight)

FISHERMEN 0 (numbers) HOURS FISHED _____ (total)
 FISH CAUGHT 0 FISH/HOUR _____ Abundance L M H

LENGTH FREQUENCY

Total Length in mm

SPECIES	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
CUT					1	4			
SUCKER									2
TOTAL	0	0	0	0	1	4	0	0	2

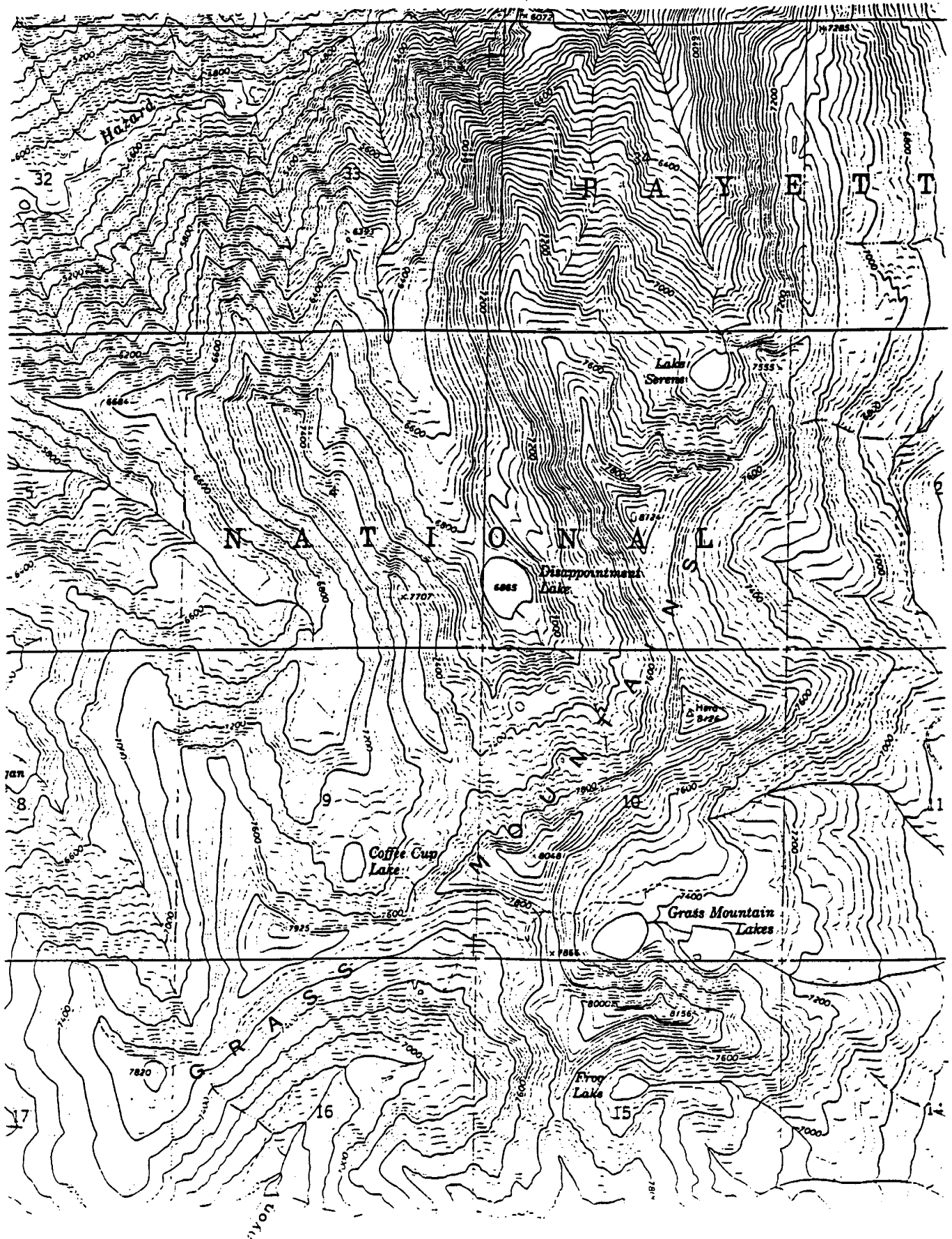
FISH CONDITION

SPECIES	TOTAL LENGTH (mm)		WEIGHT (g)		CONDITION (K)	
	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE
CUT	259.2	225-275	150	100-200		
LG. SCALE SUCKER	451		2000			

STOCKING HISTORY

YEAR	SPECIES	NUMBER OF FISH	COMMENTS
1992	C2	1000	
1993	C2	500	
1995	C2	500	

COMMENTS:



Appendix D. Serene Lake survey data forms.

Idaho Fish and Game
Mountain Lake Survey Form

LAKE NAME: Serene Lake DATE: 08-04-95
IDFG CATALOG #: 0 7: _ _ : _ _ : 0 1 5 9 EPA #: _____
MAJOR DRAINAGE Little Salmon River
MINOR DRAINAGE: Hazard Creek
COUNTY: Idaho REGION: _____
USFS RANGER DIST: _____
WILDERNESS AREA: _____
SECTION: _____ TWNSHP: _____ RANGE: _____ ELEVATION: 7000 Feet

PHYSICAL:

LAKE TYPE: 1 1.cirque 2.moraine 3.slump 4.caldera 5.beaver
TOTAL SURFACE AREA: 3 . 1 Hectares (7.7 acres)
DEPTH PROFILE: _____ ASPECT: _____
1. deep (75% of lake >6m deep) 1. Lake has north facing exposure
2. moderate (50% of lake >6m deep) 2. Lake has south facing exposure
3. shallow (25% of lake >6m deep) 3. Lake has east facing exposure
MAXIMUM DEPTH: _____ meters 4. Lake has west facing exposure
AVERAGE DEPTH: _____ meters 5. Lake is exposed in all directions

CHEMICAL

Alkalinity _____ Mg/l pH _____
Conductance 39.4 umho/cm² @ 25C Temp (surface) _____ C
Secchi depth _____ meters Temp (bottom) _____ C

SPAWNING POTENTIAL

INLET(S) 2 (number) OUTLET(S) 2 (number)
LENGTH ACCESSABLE FOR SPAWNING LENGTH ACCESSABLE FOR SPAWNING
3 meters 3 meters
INLET SPAWNING SUITABILITY: 4 OUTLET SPAWNING SUITABILITY: 3
1.Excellent (abundant)
2.Adequate (enough to maintain suitable spawning population)
3.Fair (not adequate to maintain population)
4.Poor (not suitable for successful spawning)

USE:

CAMPSITES 1 (number) FIRE PITS 1 (number) LITTER L M H
TRAIL AROUND LAKE: _____ complete X partial, trampled: YES NO
ACCESS: X good trail _____ poor trail _____ cross country

BIOLOGICAL:

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density (o/l)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Appendix D. Continued.

INSECT COMPOSITION AND ABUNDANCE

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
Mosq	L M H	Ants	L M H
Striders	L M H	Grasshoppers	L M H
	L M H		L M H

FISH SURVEY (Gill netted overnight)

FISHERMEN 0 (numbers) HOURS FISHED 0 (Total)

FISH CAUGHT 0 FISH/HOUR 0 Abundance L M H

LENGTH FREQUENCY

Total Length in mm

SPECIES	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
BKT			1	2	1		2		
CUT/RBT							1		
CUT						1	2		
TOTAL	0	0	1	2	1	1	5	0	0

FISH CONDITION

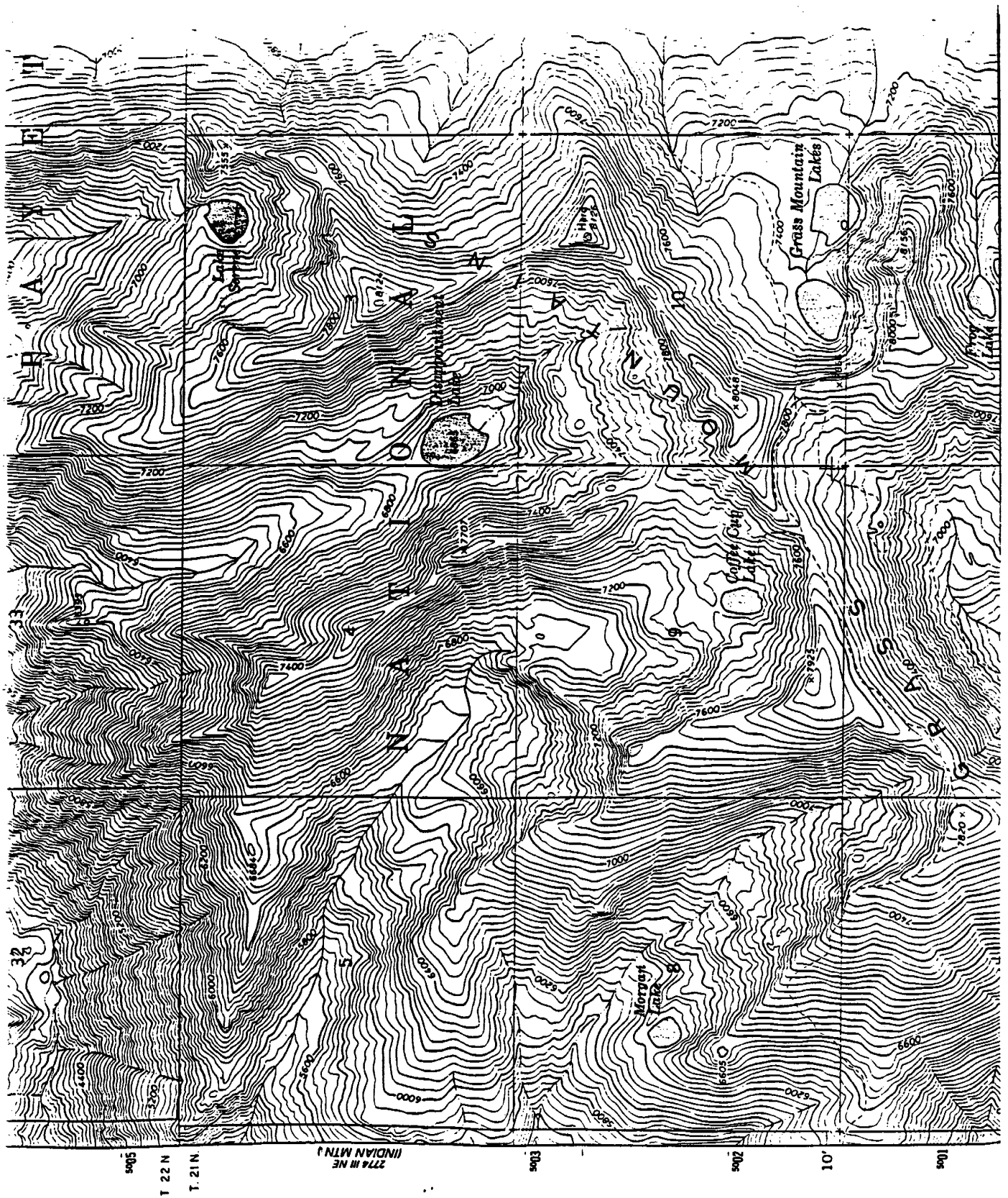
	TOTAL LENGTH (mm)		WEIGHT (g)		CONDITION (K)	
SPECIES	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE

STOCKING HISTORY

YEAR	SPECIES	NUMBER OF FISH	COMMENTS
1991	C2	500	
1994	C2	400	

COMMENTS:

Appendix D. Continued.



1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project I: Surveys and Inventories

Subproject I-C: Southwest Region (McCall)

Job: b

Title: Lowland Lakes Investigations

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

We conducted the annual kokanee *Oncorhynchus nerka kennerlyi* age class population sampling in Payette Lake,. We continued both the lake trout *Salvelinus namaycush* reward tagging study and the lake trout sonar tracking study. We also conducted a total angler use and harvest survey in 1995.

We estimated 194,242 age 0+ and 107,929 age 1+ kokanee in Payette Lake in 1995. We tagged an additional 94 lake trout in 1995 with \$10.00 reward tags. A total of eight fish were recaptured in 1995, none of which were harvested. There were 128 tagged fish remaining in the lake as of December 1, 1995. By tracking sonar-tagged fish, we located five probable spawning sites. We also found that lake trout in Payette Lake utilize large areas of the lake, intermixing regularly with other lake trout in the same basin. No isolated populations were found in either basin. However, we found that only four of the ten lake trout tracked used both basins, while the other six never left the basin in which they were tagged.

A creel survey on Payette Lake revealed that 8,333 angler hours were spent from April 30 through November 11, 1995 to catch 1,175 trout and salmon for a catch rate of 0.14 fish/h.

We set gill nets in Little Payette Lake to monitor fish populations. Rainbow trout *O. mykiss* made up 30.7% of the biomass and 44% by number of all fish collected. Average daily growth rates averaged 0.05 and 0.13 mm for rainbow stocked in 1993 and 1994, respectively.

We fished gill nets a total of 180 net hours in Cascade Reservoir and collected two rainbow trout. We aged smallmouth bass *Micropterus dolomieu* collected by electrofishing. The oldest collected were aged at 5+ and averaged 262 mm.

Smallmouth bass populations were sampled in both Oxbow and Hells Canyon reservoirs to monitor effects of special bass regulations put into affect in January 1992 on Oxbow Reservoir. We found no significant changes in smallmouth bass growth or population structure when compared to years prior to the change..

A Memorial Day weekend creel census on Horsethief Reservoir revealed that 3,096 angler hours were spent on Saturday and Sunday to harvest 1,273 fish, 98% of which were trout.

Horsethief Reservoir was chemically treated with rotenone in October to remove yellow perch *Perca flavescens*.

We surveyed Goose Lake and collecting 50 rainbow trout, 52 brook trout *S. fontinalis*, 3 cutthroat trout *O. clarki*, and 3 kokanee. A kokanee spawning run was observed in Goose Creek, above the reservoir, in September.

Authors:

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Regional Fishery Manager

OBJECTIVE

To maintain information for fishery management activities and decisions for lowland lakes and reservoirs.

INTRODUCTION

Payette Lake

Payette Lake was previously described by Grunder et al. (1990). We conducted the annual kokanee *Oncorhynchus nerka kennerlyi* age class population estimate in 1995.

Due to concerns of vulnerability and possible over harvest of lake trout *Salvelinus namaycush* we continued the 1994 lake trout reward tagging study (Janssen et al. 1997) through 1995.

We continued the 1994 lake trout tracking study (Janssen et al. 1996) through 1995. The objectives of this study were to answer the following questions:

1. Where do lake trout spawn in Payette lake?
2. If we collect the majority of lake trout for tagging from a small number of locations do they disperse quickly and evenly throughout the total lake trout population?
3. Do lake trout intermix and to what degree, between the two major basins (east and west). The two major basins are connected only by a narrow 200 foot wide by 20 feet deep gap.

An intensive creel survey was initiated in 1995 on Payette Lake to determine angler use and harvest.

Little Payette Lake

Little Payette Lake (LPL) has been described previously by Janssen and Anderson (1992). Northern squawfish *Ptychocheilus oregonensis* and largescale sucker *Catostomus macrocheilus* numbers and biomass had increased significantly in recent years to where they threatened the quality rainbow trout *O. mykiss* fishery in the lake. We surveyed the fish population in 1995 to monitor trout growth, condition, and relative abundance of nongame fish populations.

Cascade Reservoir

Cascade Reservoir has been stocked annually with 150,000-300,000, eight to ten-inch rainbow trout and up to 600,000 coho *O. kisutch* and/or kokanee salmon. We sampled the fishery in August 1995 to monitor stocking success.

Throughout 1994 and 1995 we had several requests from the public to place a special regulation on smallmouth bass *Micropterus dolomieu* in Cascade Reservoir. The smallmouth bass population was sampled in July 1995 to determine the effects of such a regulation.

Hells Canyon Reservoir Complex

A special bass regulation went into effect January 1, 1992 on Oxbow Reservoir. The regulation is a protected 12- to 16-inch slot, with no bass harvest allowed until July 1. After July 1 the bass limit is two fish. The smallmouth bass population structure and growth rates in Oxbow and Hells Canyon reservoirs were previously described by Janssen et al. (1994). Hells Canyon Reservoir was used as a control for monitoring age structure changes in Oxbow Reservoir as it has no special bass regulation. Idaho and Oregon biologists sampled the bass population in both reservoirs in 1995 to determine effects of the new regulation after three years.

Horsethief Reservoir

A Memorial Day weekend creel survey was conducted on Saturday and Sunday to continue our annual angler use trend work.

Trout fishing success had deteriorated rapidly in 1995 due to a rapidly expanding yellow perch *Perca flavescens* population. Yellow perch in the 125 to 150 mm range dominated the fishery and reduced growth rates of hatchery stocked trout in the reservoir (Appendix A.) The lake was chemically treated with rotenone to remove yellow perch from the system.

Goose Lake

We conducted a standard Idaho Department of Fish and Game (IDFG) lowland lake, fish community survey on Goose Lake in 1995.

METHODS

Payette Lake

Kokanee were sampled in Payette Lake for the eighth consecutive year on August 24 and 25, 1995, with a midwater trawl. Methodology for the trawling technique was reported by Bowles et al. (1986 and 1987) and Grunder et al. (1991).

Methods used for the lake trout tagging studies were presented in Janssen et al. (1997). Relative weights of lake trout were calculated using the standard weight equation developed by Piccolo et al. (1993).

We located sonar-tagged lake trout twice under the ice and twice a month during the remainder of the year except during spawning (August, September, and October). No particular time of day was targeted when locating tagged fish except during spawning.

During suspected spawning times we located tagged fish weekly from August 28, 1995 through October 6, 1995. Fish were located at dawn to maximize the chance of finding fish on spawning areas. Suspected spawning activity was defined as fish moving uncharacteristically close to shore, usually in locations not used at other times of the year, with specific fish spending several days in one such location.

The creel survey began on May 1, 1995, and ran through November 11, 1995. The survey was structured to sample eight weekdays and four weekend days in consecutive four week periods. Days were split up into two equal time periods between sunrise and sunset.

We made three angler counts per day during the selected count period (a.m. or p.m.) at three-hour intervals. Angler counts included number of shore anglers and number of fishing boats. The number of anglers in each boat were not counted. The exact creel days and count period were selected randomly using the Idaho Department of Fish and Game standard creel survey computer program (McArthur et al. 1993). This program was also used to summarize the data and generate total use, harvest, and catch rate estimates. The time before, between, and after counts was used to make angler contacts.

Little Payette Lake

On October 17, 1995 we set four, standard lake survey gill nets in Little Payette Lake (four diving nets). We connected two of the diving nets end to end to fish a longer, deeper section of bottom contour. We fished two locations with the four nets. The nets were set on the afternoon of October 17, 1995, fished all night and were pulled the next morning. All fish collected were weighed and total length measured. We checked all fish for fin clips.

Cascade Reservoir

During the week of August 9, 1995 we set three midwater, experimental gill nets at three different locations. Nets were set in early August to take advantage of the strongly stratified water column which helped concentrate salmonids. We suspended the nets in pelagic, deep water areas away from the shoreline to minimize the catch of non-salmonids. At each location, dissolved oxygen (DO) and temperature profiles were measured to determine depth of the thermocline.

We used 6-ft-high experimental diving gill nets which were suspended at a given depth with the use of floats tied on to the nets with a measured amount of rope. One net was hung to cover the thermocline the other two nets were set to cover the water column just above and below the middle net. With this arrangement we covered 18 vertical ft of the water column at each location. The nets were set, allowed to fish all night and then pulled the next day. After all fish were removed from the nets, the nets were reset at the next location. All salmonids collected were weighed and total length measured.

We used a boat electrofishing unit to sample smallmouth bass along the shoreline adjacent to the Cascade City golf course and Crown Point on Cascade Reservoir on July 6, 1995. All bass collected were

weighed and total length measured. Scales were taken from five fish from every 10 mm length group. The fish were then released back into the reservoir. Fish scales were later examined in the lab to determine age and make back-calculations of growth. We used the computer program DISBCAL (Missouri Department of Conservation, 1989) to back-calculate and summarize fish growth.

Hells Canyon Reservoir Complex

Idaho and Oregon state biologists electrofished Oxbow and Hells Canyon reservoirs on the nights of May 1 and 2, 1995 to sample smallmouth bass populations. We used the same techniques and transects as described by Janssen and Anderson (1994).

Horsethief Reservoir

We conducted the annual creel survey on May 27 and 28, 1995. All shore, boat, and float tube anglers were counted at two-hour intervals beginning at 0730, with the last count at 1930 h for a total of seven counts each day. Between counts as many anglers as possible were contacted to record number of hours fished, species caught, and number of fish harvested.

Methods for the Horsethief Reservoir treatment were written up in another report and are presented in Appendix A.

Goose Lake

We surveyed fish in Goose Lake using three experimental gill nets (one floating, two diving). Nets were set in the afternoon, fished over night, and pulled the next morning. Each net was set perpendicular to shore with one end anchored to shore. All fish collected were weighed and measured.

RESULTS

Payette Lake

Kokanee Population Status

We estimated the population size of wild, age 0+ kokanee in Payette Lake on August 24, 1995 to be $194,242 \pm 57.5\%$ fish (Table 1). Estimated mean densities (fish/ha) of age 0+ and 1+ were 113 and 63 fish/ha respectively.

Total kokanee biomass, not including adult fish, (current year's spawners) was estimated at 4.2 kg/ha. Total biomass, including 1995 spawner escapement estimates, was 9.0 kg/ha. This biomass estimate

included very few fish >180 mm (age 2+) that did not spawn in 1995 due to the inefficiency of the trawl to capture larger fish. In addition to this estimate, there is a shoreline spawning component of the kokanee population about which little is known, but is felt to be fairly insignificant in terms of numbers.

Table 1. Summary of mid-water trawl data collected at Payette Lake, Idaho, 1980 and 1988 through 1995 with 95% error bounds in \pm (%). All estimates are based on a useable surface area of 1,715 ha (> 40 ft depth).

Year	Of	Number	Age				Spawners
Estimate	Stocked	0+	1+	2+	3+ ^a	(3+ ^b)	
<u>Number of Hatchery Kokanee</u>							
1988	350,000	34,000	0	0			
1989	350,000	18,000	0	0			
1990	301,000	27,000	0	0			
1991	158,000	?	?	0			
1992	130,530	19,774 (79%)	?	?			
1993	125,400	11,444 (98%)	0	0			
1994	0 (stocking discontinued)			0			
<u>Number of Wild/Natural Kokanee</u>							
1980		100,000	73,000	16,000	20,000	20,000	
1988		74,800 (40%)	<2,000 (85%)	9,000 (88%)	^d	22,800	
1989		120,000 (33%)	21,000 (33%)	0	^d	14,500	
1990		134,000 (45%)	26,000 (45%)	10,000 (100%)	^d	16,700	
1991		128,000 (28%)	67,500 ^c	1,187	^d	18,000	
1992		202,240 (21%)	30,887 (41%)	5,015 (118%)	^d	29,300	
1993		301,744 (104%)	117,215 (65%)	7,271 (83%)	^d	59,310	
1994		152,689 (88%)	46,974 (54%)	30,432 (99%)	^d	44,200	
1995		194,242 (57%)	107,929 (33%)	54,635 (65%)	8,373 (84%)	?	
<u>Estimated Wild Kokanee Densities (fish/ha)</u>							
1980		58	43	9	10		
1988		44	<2	5	NA	13.3	
1989		70	12	0	NA	8.4	
1990		78	15	6	NA	9.7	
1991		75	39 ^c	0.69	NA	10.5	
1992		118	18	3	NA	17.1	
1993		176	68	4	NA	34.6	
1994		89	27	18	NA	25.8	
1995		113	63	32	4.9	32.3	
<u>Estimated Wild Kokanee Biomass (kg/ha)</u>							
1980		0.04	0.9	0.5	1.8		
1988		0.06	0.03	NA	NA	4.6	
1989			0.24 (for ages 0+, 1+, & 2+ combined)			2.9	
1990		0.07	0.13	0.8	0.6	3.5	
1991		0.075	1.2 ^c	0.1	NA	5.3	
1992		0.15	1.1	0.45	NA	6.4	
1993 ^e		0.10	1.8	0.6	NA	8.5	
1994		0.10	1.9	0.6	NA	5.5	
1995		0.04	1.4	2.8	0.8	4.8	

^a These fish spawned the following fall.

^b Based on corrected spawner escapement counts in North Fork Payette River (1.73 x peak spawner count)(Frost and Bennett, 1994).

^c Includes age 0+ hatchery fish.

^d Estimates not reliable because fish greater than 200 mm are not completely vulnerable to the trawl.

^e Estimate was made in August instead of September when other years estimates were made.

Lake Trout Tagging Study

We tagged 94 lake trout in 1995 with \$10 reward spaghetti tags. Since September 1993 we have tagged 130 lake trout with reward tags. In 1995, a total of eight fish were recaptured, three with gill nets, and five by hook and line. All eight fish were released and all but two were released with the tag still attached. Therefore, 128 tagged fish remained in the lake as of December 1, 1995.

Since 1988 sixteen tags have been returned that could be used for growth rate analysis. Time between first tagging and recapture date ranged from 7.5 to 83 months. Only two tags were returned from fish <635 mm when first tagged. These two fish had grown 1.2 and 7.3 mm per month or 14.4 and 87.6 mm per year. The other 14 fish had averaged 1.92 mm per month or 23.1 mm per year (0.91 inches).

Lengths of lake trout collected in 1994 and 1995 ranged from 506 to 1,000 mm (Figure 1), and weights from 1.6 to 13.4 kg. Mean length and weight of sampled lake trout was 734 mm and 4.7 kg. Relative weights (W_r) ranged from 77 to 138 and averaged 105 (Figure 2). We found a general trend of higher W_r 's with increasing length which was significant at the 5% level. Length-weight relationships are presented in Figure 3.

Lake Trout Sonar Tracking Study

We surgically implanted two additional sonar tags into lake trout in 1995 for a total of 10 (five females and five males). Total lengths of sonar-tagged fish ranged from 680 to 920 mm with weights ranging from 3.5 to 10.08 kg (Table 2).

Of the ten tags tracked, two stopped functioning. Tag number 339 had not been heard since May 11, 1994, indicating either the fish was harvested or the tag had failed. Tag number 294 had not changed location since August 14, 1995, indicating either the tag was shed and/or the fish had died. Both of these fish were males.

We recaptured two of the sonar-tagged fish in 1995. Fish number 276 was recaptured twice in 1995, once by hook and line through the ice in March, and once with a gill net in June. Both times the fish was released unharmed. The incision site for the original sonar tag insertion was completely healed over, only a scar remained. However, the anchor tag we placed in the original incision was gone. A new spaghetti tag was placed under the dorsal fin. We recaptured fish number 348 in July with hook and line gear. Again the incision site was completely healed over with no sign of infection, only a scar remained. The fish was released unharmed. This fish had been tagged with a spaghetti tag when the sonar tag was implanted. This tag was securely attached with no signs of infection.

We located five probable spawning sites by tracking fish during spawning times (Figure 4) and three or four possible sites. Generally, fish began to appear on suspected spawning sites as early as the last week in August. We found the majority of activity was from August 28 through September 28 in both 1994 and 1995.

Of the five females tracked during spawning time, two returned to the same spawning locations they had used the previous year, suggesting preference or loyalty to a given spawning site and that at least some percentage of females can and do spawn every year. Two of the other three females appeared to spawn one year and made no obvious spawning appearances anywhere the other year. The last female was monitored only during one year's spawning time and it showed no obvious spawning activity. Females were observed on a given spawning site and/or directly adjacent to a site for as long as five weeks.

Of the five males tracked during spawning time, only two spent several consecutive days at a given location. One of these used the same location both years, the other used a different location each year. The other three males showed no long-term interest in any given site making it difficult to determine if and where these fish spawned.

Lake trout in Payette Lake utilized large areas of the lake. We found that four of the ten sonar-tagged fish used both the east and west basins of the lake (one female and three males). Three of the four fish changed basins more than once. Movements of tracked fish suggested three patterns of fish movement or home range. They used either the entire east basin, or the entire west basin or they used the north half of the west basin and all of the east basin.

No isolated populations of lake trout were found within a basin and it appears that these fish intermix a great deal. However, we did find a significant segregation of fish between basins. Six of the ten fish tracked never left the basin in which they were tagged.

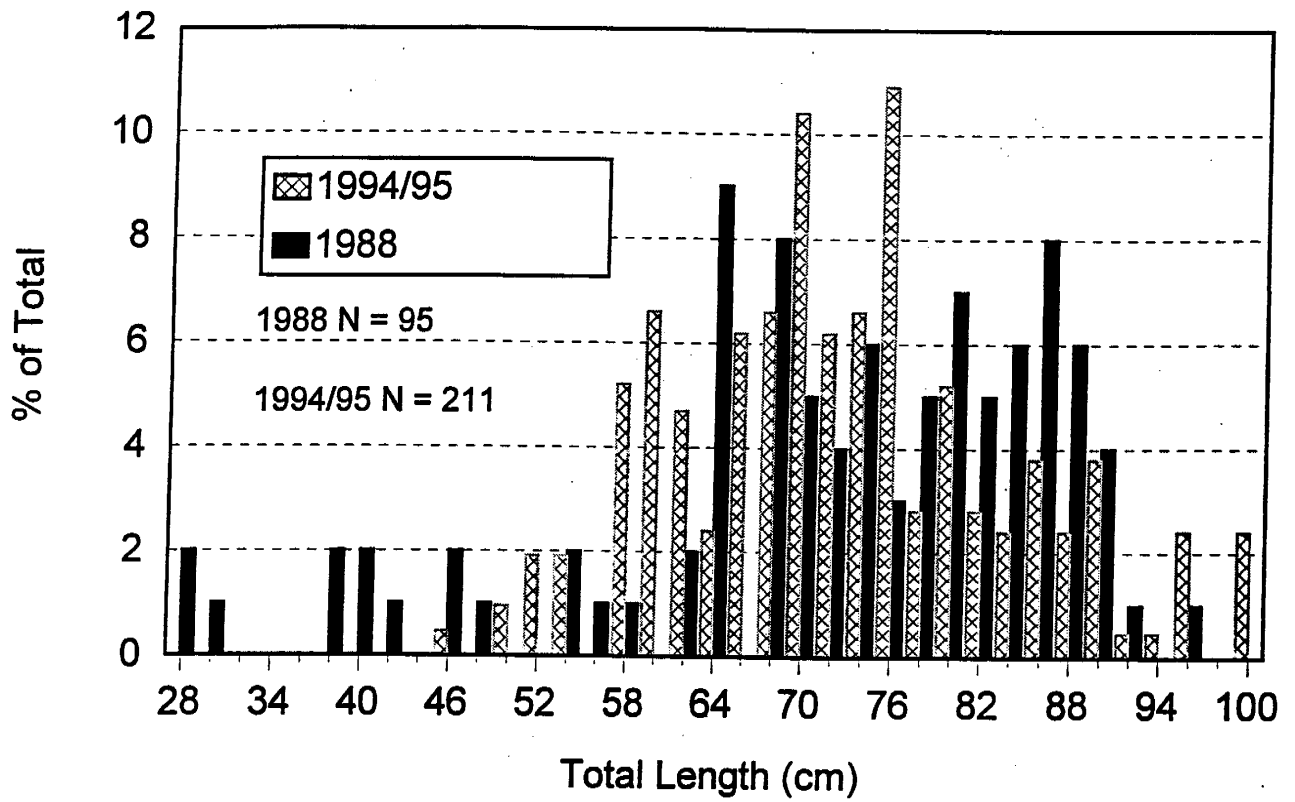
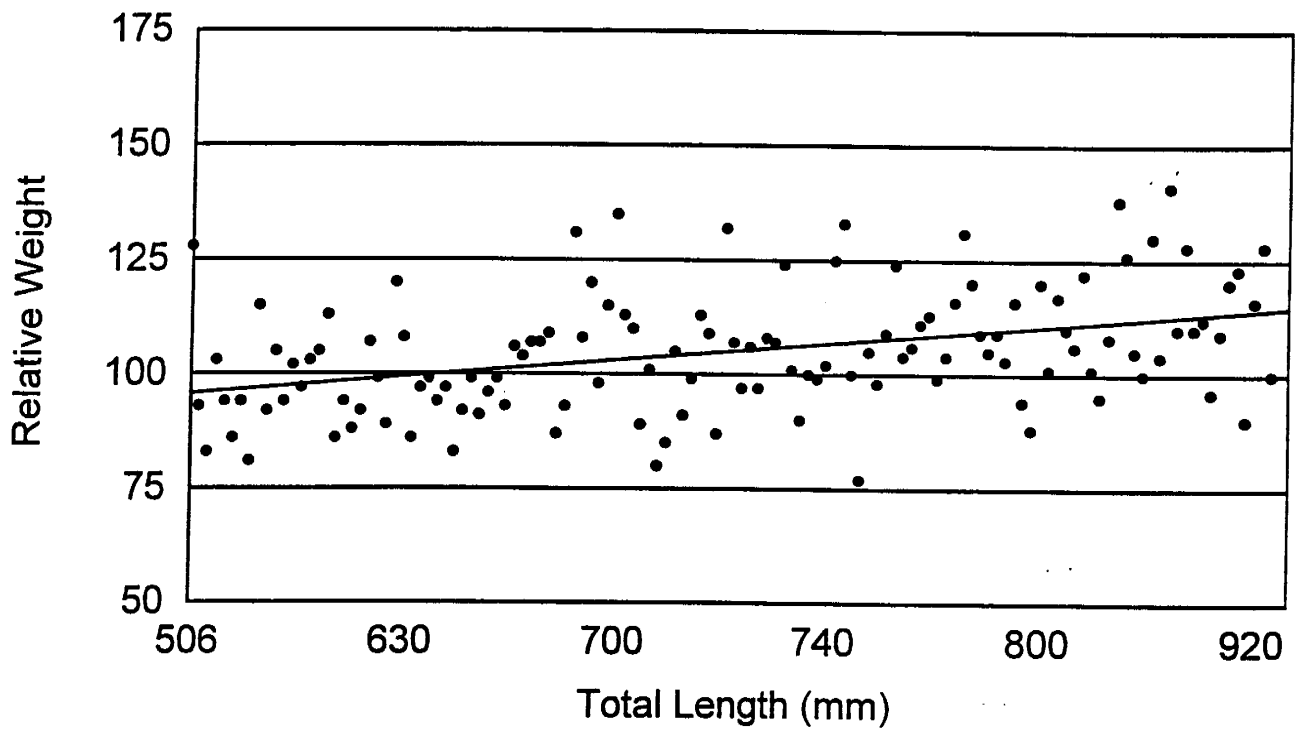


Figure 1. Payette Lake, lake trout length frequencies for 1988 and 1994/95.



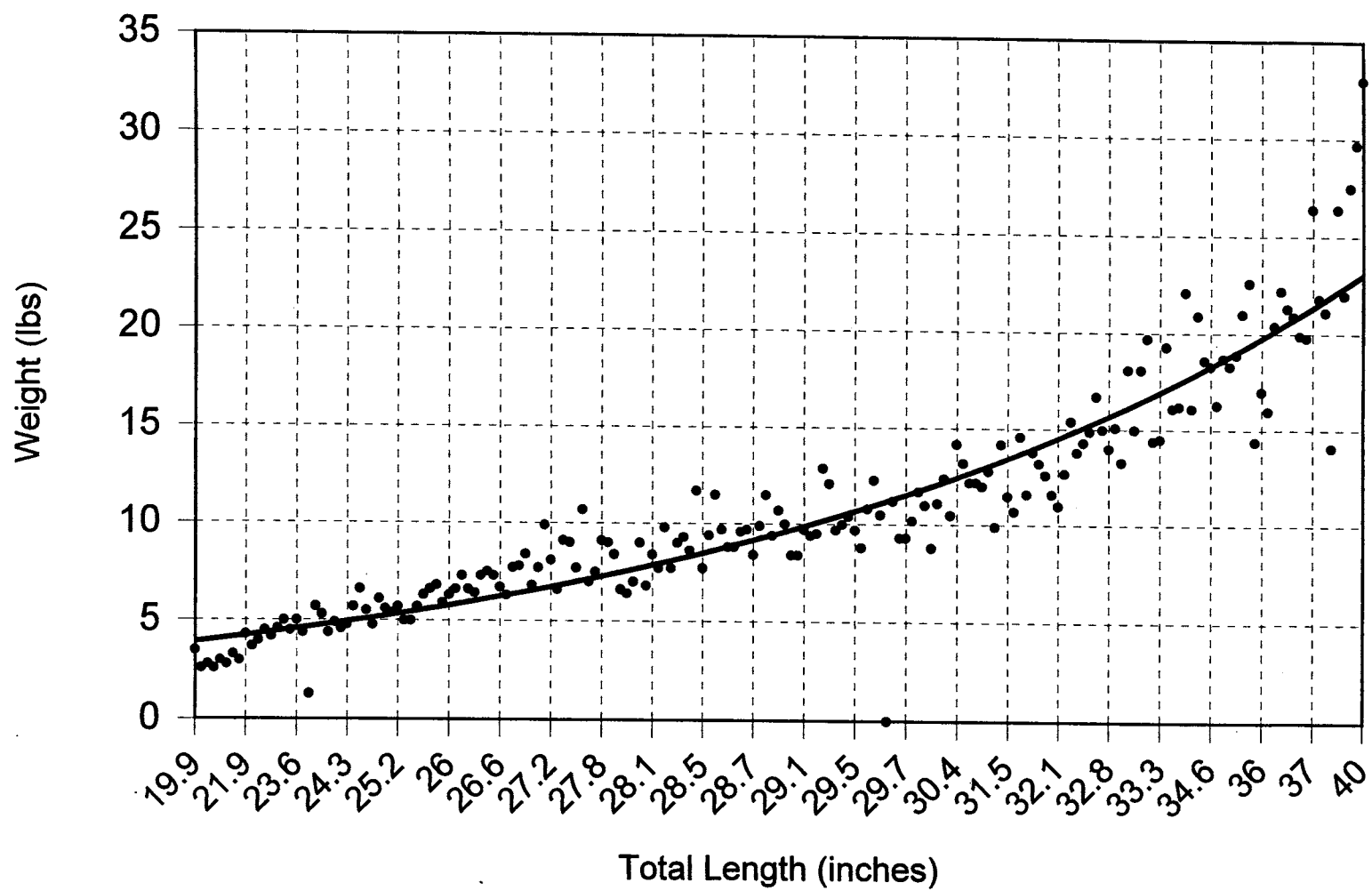


Figure 3. Length weight relationship of Payette Lake, lake trout collected from 1993 through 1995.

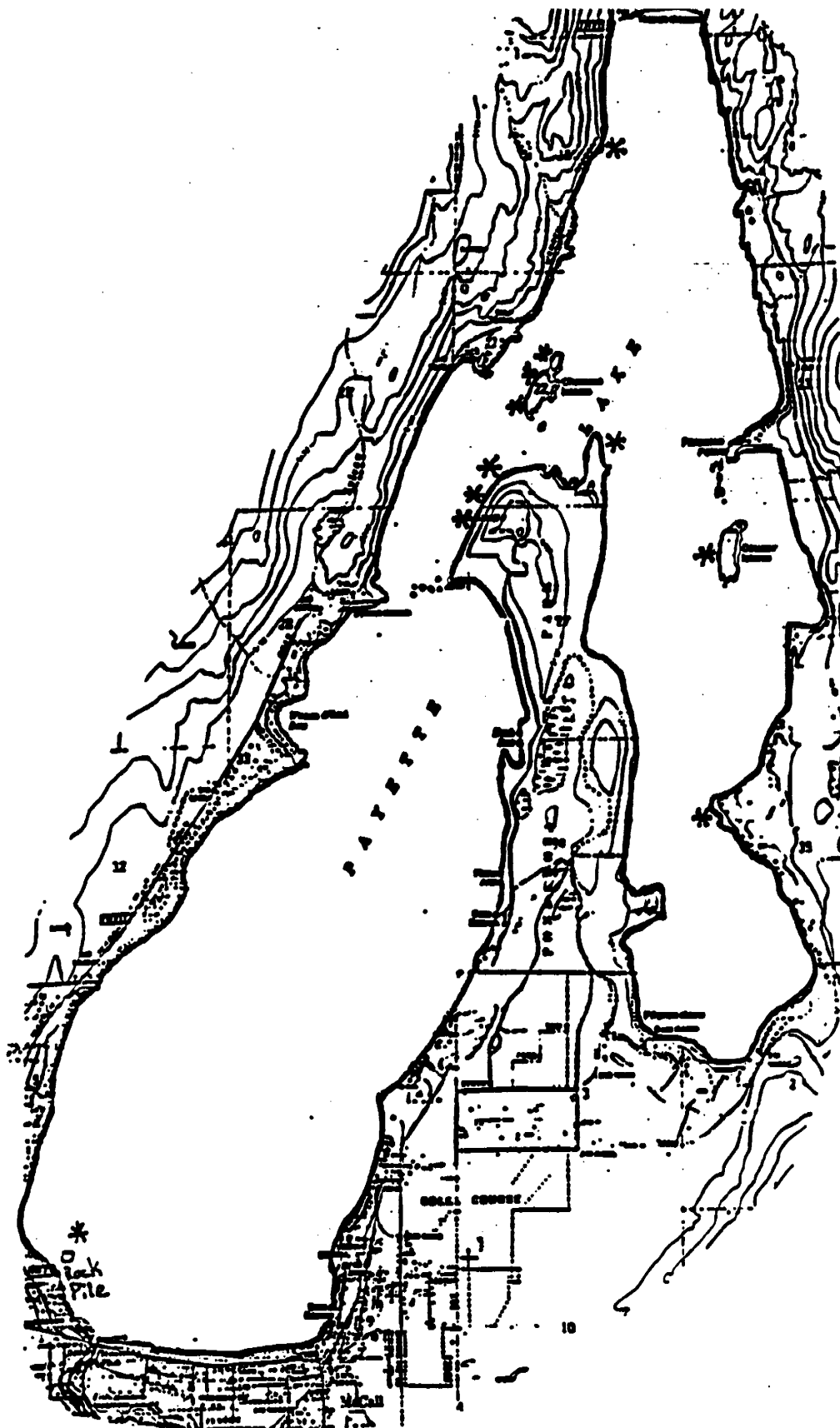


Figure 4. Probable spawning sites (*) of sonar tagged lake trout in Payette Lake, in 1994 and 1995

Table 2. Total lengths, weights, sex, tag number, and current status of sonar tagged lake trout in Payette Lake.

Tag Number	Date Tagged	Total Length (mm)	Weight (g)	Sex	Current Status
249	7/6/94	780	5,550	F	active
258	7/6/94	737	3,800	F	active
267	7/6/94	864	10,025	F	active
276	7/15/94	920	10,080	F	active
285	6/30/94	745	5,850	M	active
294	8/5/94	725	5,300	M	no movement since 8/14/95
339	8/5/94	772	6,450	F	no signal since 5/11/95
348	5/23/95	698	3,500	M	active
357	5/23/95	680	3,500	M	active
366	8/5/94	698	4,100	M	active

While these fish moved a great deal they spent most of their time on several key locations. Most key locations in a given basin were used by all fish monitored in the basin. These locations had similar bottom structure features, in depths ranging from 30 to 120 feet. Submerged points, ledges, flats and rock piles were structures found on all or most of the key locations used by tagged lake trout. We found that lake trout will use virtually all of these locations at any time of year, indicating there are no temperature barriers to lake trout habitat in Payette Lake.

Angler Use Survey

We found that anglers spent an estimated 8,333 total hours (3.9 hrs/ha), from May through October to catch an estimated 1,175 fish (Tables 3 and 4). Of the 1,175 fish caught, 438 were released. Catch rates averaged 0.14 fish/h for all fish caught for the May through October season surveyed (Table 5). Average catch rate for all fish harvested for the sample period was 0.09 fish/h.

By number, kokanee were the most important with 479 creel. An estimated 111 rainbow trout, 13 westslope cutthroat trout, 40 lake trout, and 11 rainbow trout x cutthroat trout hybrids were also harvested.

Boat anglers made up an estimated 97% of all fishing pressure on Payette Lake and spent an estimated 8,124 h fishing. Shore anglers accounted for 209 h.

Table 3. Angling pressure estimates for May through October 1995, by angler type and day type on Payette Lake.

Date	Daytype ^a	Boat Angler Hours	Bank Angler Hours	Total Angler Hours
4/30-5/27/95	WD WE	222 1728	0 34 68	222 1762
Interval 1 Tot: +/- 95%CI:		1950 881		1984 884
5/28-6/29/95	WD WE	1331 1247	0 175	1331 1422
Int 2 Tot: +/- 95%CI:		2578 1057	175 308	2753 1101
6/25-7/22/95	WD WE	738 812	0 0	738 812
Int 3 Tot: +/- 95%CI:		1550 545	0 0	1550 545
7/23-8/19/95	WD WE	882 272	0 0	882 272
Int 4 Tot: +/- 95%CI:		1154 376	0 0	1154 376
8/20-9/16/95	WD WE	424 425	0 0	424 425
Int 5 Tot: +/- 95%CI:		849 341	0 0	849 341
9/17-10/14/95	WD WE	0 14	0 0	0 14
Int 6 Tot: +/- 95%CI:		14 27	0 0	14 27
10/15-11/11/95	WD WE	0 29	0 0	0 29
Int 7 Tot: +/- 95%CI:		29 59	0 0	29 59
1995 SEASON TOT: +/- 95%CI:	WD WE ALL ALL	3597 4527 8124 1566	0 209 209 315	3597 4736 8333 1598
^a WE = weekends, WD = weekdays				

Table 4. Total harvest estimates by species and date for May through October 1995 for Payette Lake.

Date	Day-Type ^a	Fish Kept	Fish Released	Fish Caught	Kokanee	Lake Trout	RBT-Wild	RBT-Hatch	Cutt-Wild	Cutt-Pens	RB X Cutt	Unseen Trout
4/30-5/27/95	WD	0	0	0	0	0	0	0	0	0	0	0
	WE	65	55	120	0	33	33	0	0	0	11	0
Interval 1 Tot:		65	55	120	0	33	33	0	0	0	11	0
+/- 95%CI:		99	76	129	0	42	69	0	0	0	23	0
5/28-6/24/95	WD	55	13	68	28	0	13	0	0	0	0	0
	WE	74	13	87	27	7	13	0	13	7	0	0
Int 2 Tot:		129	26	155	55	7	26	0	13	7	0	0
+/- 95%CI:		108	36	117	61	10	39	0	21	13	0	0
6/25-7/22/95	WD	64	51	115	7	0	0	62	0	0	0	0
	WE	64	73	137	45	0	9	38	0	0	0	0
Int 3 Tot:		128	124	252	52	0	9	100	0	0	0	0
+/- 95%CI:		127	101	174	62	0	19	206	0	0	0	0
7/23-8/19/95	WD	96	79	176	96	0	0	0	0	0	0	35
	WE	42	17	59	42	0	0	0	0	0	0	0
Int 4 Tot:		138	96	235	138	0	0	0	0	0	0	0
+/- 95%CI		153	78	171	153	0	0	0	0	0	0	35
8/20-9/16/95	WD	162	65	226	162	0	0	0	0	0	0	0
	WE	115	72	187	72	0	43	0	0	0	0	0
Int 5 Tot:		277	137	413	234	0	43	0	0	0	0	0
+/- 95%CI:		329	127	302	311	0	76	0	0	0	0	0
9/17-10/14/95	WD	0	0	0	0	0	0	0	0	0	0	0
	WE	0	0	0	0	0	0	0	0	0	0	0
Int 6 Tot:		0	0	0	0	0	0	0	0	0	0	0
+/- 95%CI:		0	0	0	0	0	0	0	0	0	0	0
10/15-11/11/95	WD	0	0	0	0	0	0	0	0	0	0	0
	WE	0	0	0	0	0	0	0	0	0	0	0
Int 7 Tot:		0	0	0	0	0	0	0	0	0	0	0
+/- 95%CI:		0	0	0	0	0	0	0	0	0	0	0
1995 Season Total:		737	438	1175	479	40	111	0	13	7	11	35
+/-95% CI:		411	199	426	358	43	111	0	21	13	23	72

^a WE = weekends, WD = weekdays

Table 5. Estimated catch/harvest rates (fish/h) for May through October 1995 for Payette Lake.

Date	Day-type ^a	Catch rate			Kokanee		RBT Wild		Lake Trout		CTT Wild		RBT X CTT		CTT-net pens	
		Kept	Rel	Cght	Kept	Rel	Kept	Rel	Kept	Rel	Kept	Rel	Kept	Rel	Kept	Rel
4/30-5/25/95	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WE	0.04	0.03	0.07	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
5/25-6/24/95	WD	0.04	0.01	0.05	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WE	0.05	0.01	0.06	0.02	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00
6/25-7/22/95	WD	0.09	0.07	0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WE	0.08	0.09	0.17	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/23-8/19/95	WD	0.11	0.09	0.20	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WE	0.16	0.06	0.22	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/20-9/16/95	WD	0.38	0.15	0.53	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WE	0.27	0.17	0.43	0.17	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/17-10/14/95	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/15-11/11/95	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995 CR Season	WD	0.09	0.05	0.14	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WE	0.08	0.05	0.13	0.06	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Season	0.09	0.05	0.14	0.07	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

^aWE = weekends, WD = weekdays

Little Payette Lake

We collected 216 fish in gill nets during the survey on October 17, 1995. This included 42 largescale suckers, 53 northern squawfish, 92 rainbow trout, 22 kokanee, 4 brook trout *S. fontinalis*, and 3 smallmouth bass. Ten of the 92 rainbow trout collected had a left ventral fin clip (stocked 5/94, Table 9) and five had a right maxillary clip (stocked 6/93, Table 9).

Rainbow trout made up 30.7% of the biomass and 44% by number of all fish collected (Table 6). Rainbow trout ranged in total length from 200 to 585 mm. Quality sized (>508 mm) rainbow trout made up 15% of all rainbow trout collected (Table 7). Condition factors (Ktl) averaged 0.96 for all length groups of rainbow trout. Average rainbow trout Ktl were 0.95 and 1.06 for fish less than and greater than 16 inches respectively (Table 8).

We found daily growth rates for rainbow trout stocked in 1993 and 1994 to be slow averaging 0.05 and 0.13 mm since last sampled on October 28, 1994 (Table 9).

Table 6. Numbers and biomass of all species of fish collected with gill nets on October 17, 1995, on Little Payette Lake.

Species	<u>N</u>	Percent of Total by Number	Total Weight (kg)	Percent of Total by Weight
rainbow trout	92	44.0	38	30.7
brook trout	4	2.0	0.75	0.6
smallmouth bass	3	1.4	1.8	1.2
kokanee	22	8.0	1.8	1.2
northern squawfish	53	25.0	35.1	28.4
large-scale sucker	42	20.0	46.3	37.4
	211		123.6	

Table 7. Length frequencies of rainbow trout gillnetted in Little Payette Lake in October 1995.

Total Length (mm)	Total Number
200	2
210	0
220	0
230	3
240	1
250	1
260	0
270	1
280	0
290	1
300	2
310	5
320	10
330	12
340	13
350	8
360	6
370	5
380	4
390	2
400	3
410	1
420	2
430	2
440	2
450	0
460	1
470	1
480	2
500	1
580	1

Table 8. Average length, weight and condition (Ktl) of rainbow trout, by length group, collected from Little Payette Lake on October 17, 1995.

Total Length (mm)	N	Average Length (mm)	Average Weight (mm)	Average Ktl
0-406	78	333	372	0.95
407-550	14	443	931	1.06

Table 9. Lengths and weights of marked rainbow trout at time of stocking and at time of gillnetting in Little Payette Lake.

Date	Clip	Action	Average Length (mm)	Average Weight(g)	Days In Lake	Growth Day (mm)
6/15/93	R. Max	Stocked	197	84	0	
10/28/94	R. Max	gill nets	314	292	498	0.24
10/17/95	R. Max	gill nets	332	359	852	0.05 ^a
5/6/94	L. Vent.	Stocked	227	134	0	
10/28/94	L. Vent.	gill nets	295	215	176	0.38
10/17/95	L. Vent.	gill nets	341	384	531	0.13 ^a
^a Since last sample on 10/28/94.						

Cascade Reservoir

We fished gill nets a total of 180 net hours and collected only two rainbow trout with total lengths of 200 and 530 mm. The larger fish appeared to be of wild origin and weighed 1,618 g. The smaller fish was of hatchery origin. We also collected 131 northern squawfish, 9 largescale suckers, 31 yellow perch and two brown bullheads *Ameiurus nebulosus*.

While electrofishing we collected a total of 16 smallmouth bass. Fish ranged in size from 195 mm and 110 g to 291 mm and 330 g (Figure 5). Ages of fish ranged from 3+ to 5+ (Table 10) and the majority of fish were age 5+. Relative weights of Cascade Reservoir smallmouth bass ranged from 70 to 116 and averaged 97.1 (Figure 6). Relative weights were more variable as length increased.

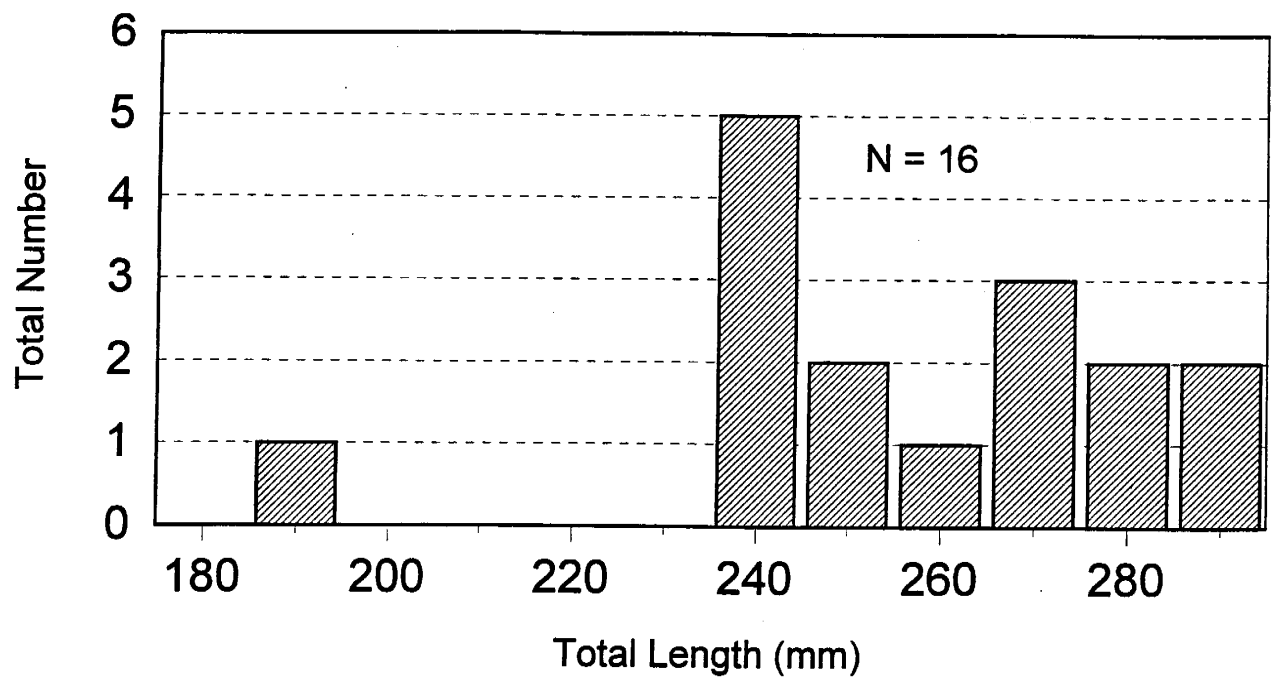


Figure 5. Length frequencies of smallmouth bass collected from Cascade Reservoir in May 1995.

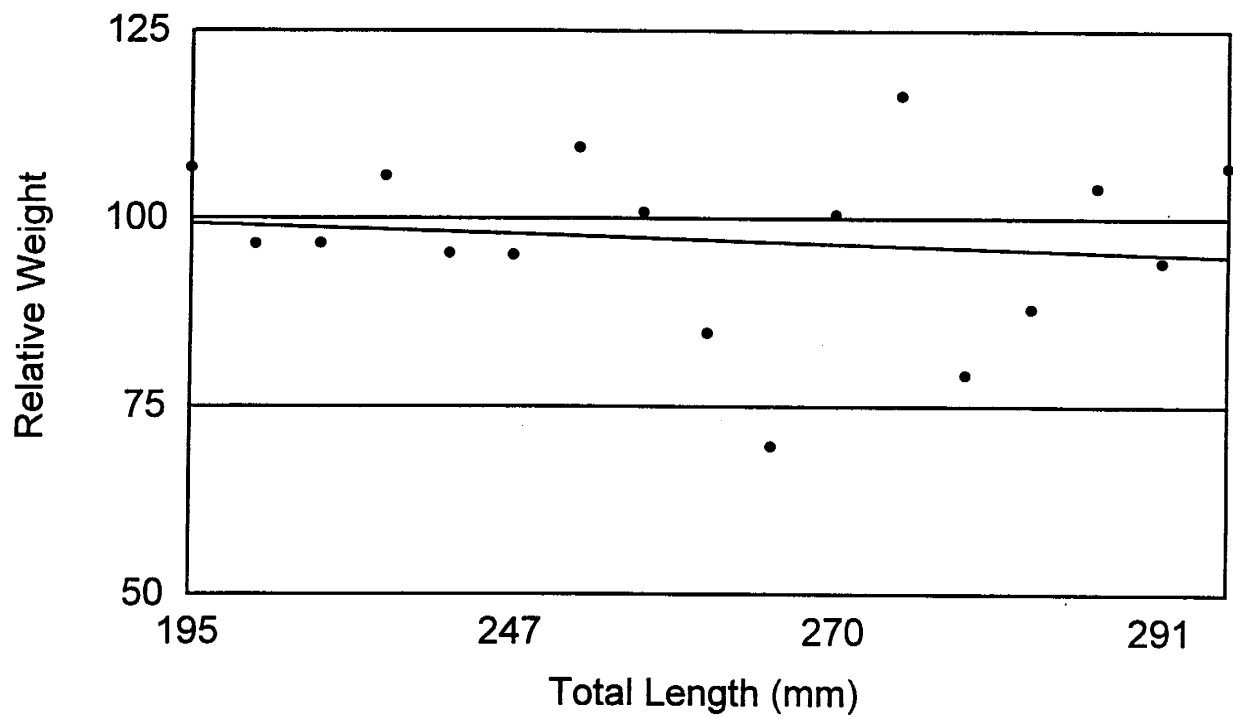


Figure 6. Relative weights of smallmouth bass collected from Cascade Reservoir in May 1995.

Table 10. Average back-calculated lengths for each age class of smallmouth bass collected from Cascade Reservoir in July 1995.

Year Class	Age	N	Back-Calculated Length at Age				
			1	2	3	4	5
1994	1	0					
1993	2	0					
1992	3	1	68	113	185		
1991	4	4	81	142	181	244	
1990	5	12	85	134	177	210	262
All Classes			83	135	178	219	262
N		17	17	17	17	16	12

Hells Canyon Reservoir Complex

We collected a total of 105 smallmouth bass in Oxbow Reservoir on May 1, 1995 and 136 in Hells Canyon Reservoir on May 2, 1995. The number of smallmouth collected in each transect on Hells Canyon Reservoir ranged from 5 to 21 and on Oxbow Reservoir from 4 to 20. The average number/transect was 13.8 and 10.8 for Hells Canyon and Oxbow reservoirs, respectively. Length frequencies of these fish are presented in Figures 7 and 8. For age determination and back-calculations we took scale samples from 53 and 26 fish from Hells Canyon and Oxbow reservoirs, respectively. Smallmouth bass up to seven years old were found in both lakes. Growth of Hells Canyon smallmouth bass was slightly faster than that found in Oxbow Reservoir (Tables 11 and 12).

Table 11. Average back-calculated lengths (mm) for each age class of smallmouth bass collected in May 1995 in Oxbow Reservoir.

Year Class	Age	N	Back-Calculated Length at Age						
			1	2	3	4	5	6	7
1994	1	0							
1993	2	0							
1992	3	0							
1991	4	7	73	141	192	246			
1990	5	9	81	143	193	245	282		
1989	6	5	69	117	168	210	246	281	
1988	7	5	85	145	202	233	260	285	311
All Classes			77	138	190	236	267	283	311
N		26	26	26	26	26	19	10	5

Table 12. Average back-calculated lengths (mm) for each age class of smallmouth bass collected in May 1995 in Hells Canyon Reservoir.

Year Class	Age	N	Back-Calculated Length at Age						
			1	2	3	4	5	6	7
1994	1	2	93						
1993	2	5	87	165					
1992	3	25	92	141	203				
1991	4	9	86	151	203	253			
1990	5	5	81	147	204	257	300		
1989	6	6	85	144	198	228	275	302	
1988	7	1	71	128	180	227	254	278	306
All Classes			88	146	214	246	284	298	306
N		53	53	51	46	21	12	7	1

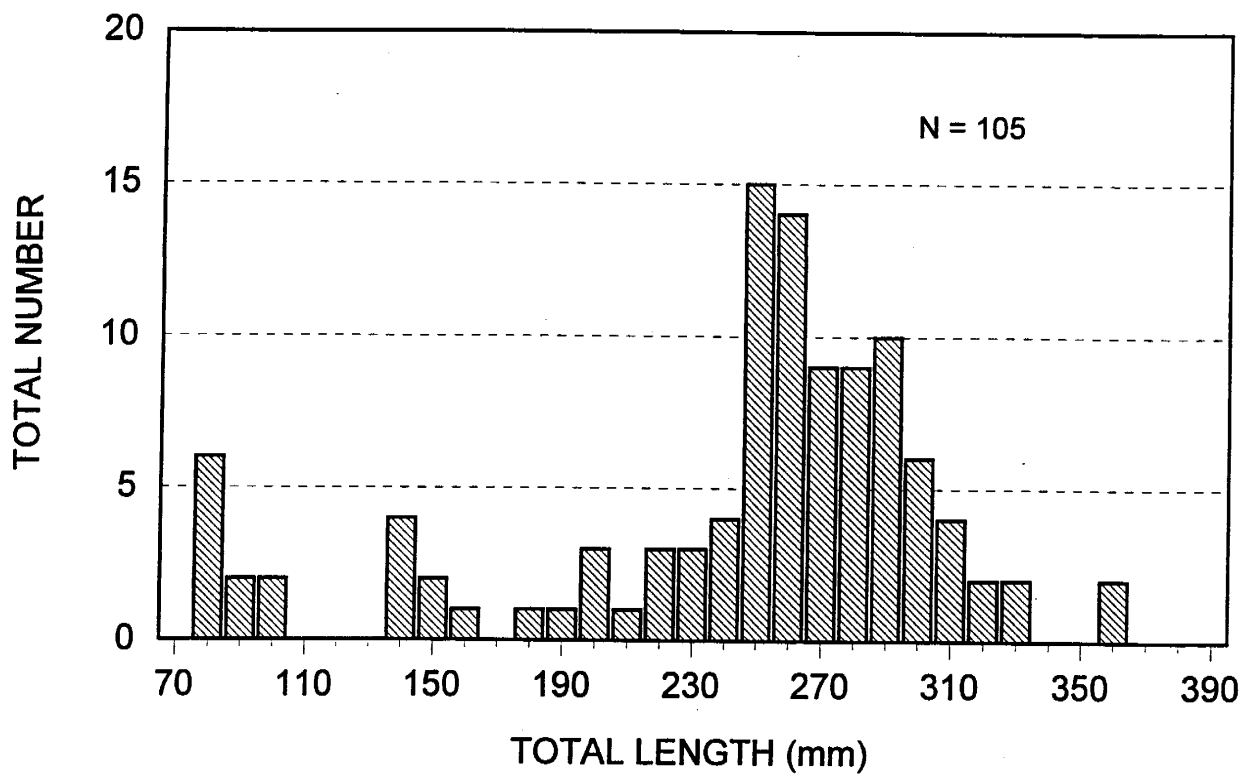


Figure 7. Length frequencies of smallmouth bass collected from Oxbow Reservoir in May 1995.

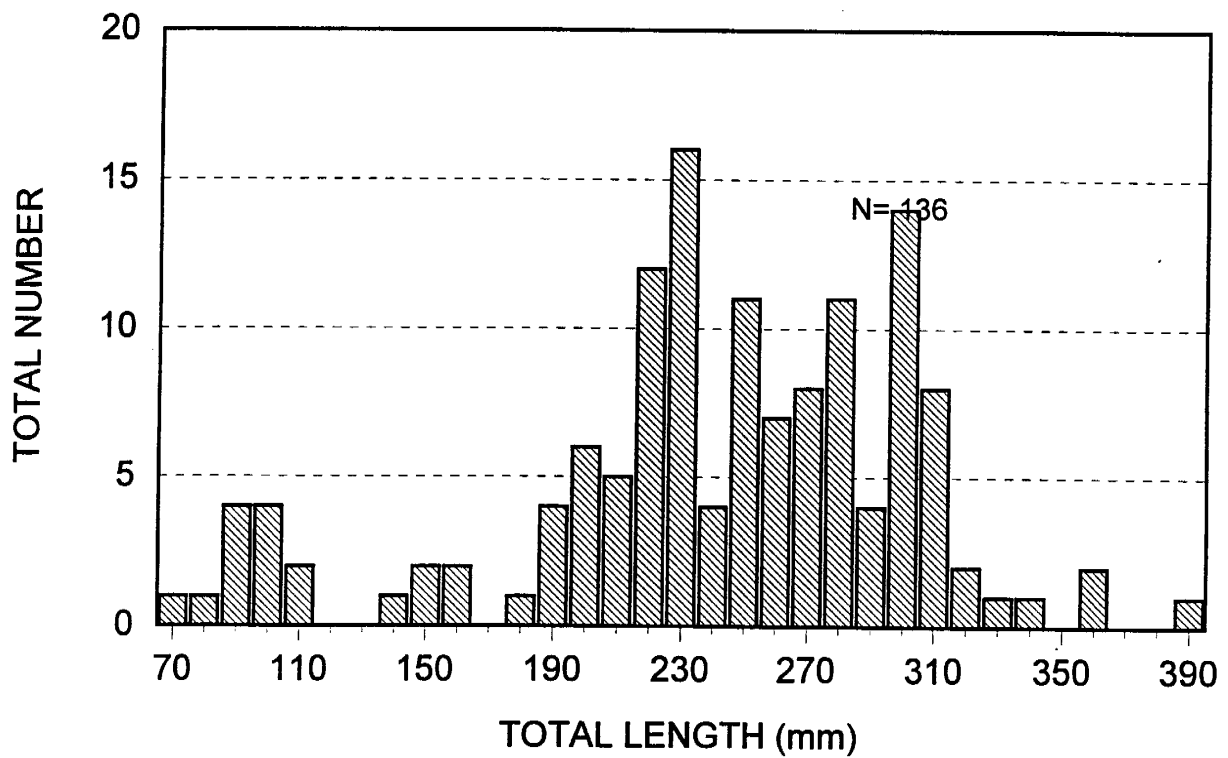


Figure 8. Length frequencies of smallmouth bass collected from Hells Canyon Reservoir in May 1995.

Horsethief Reservoir

We estimated 3,096 angler hours were spent to catch 1,273 fish on May 27-28, 1995. The overall catch rate was 0.41 fish per h. The catch composition was 68% rainbow trout, 21% splake brook trout x lake trout, 2% yellow perch, 2% brown trout *Salmo trutta*, 6% rainbow trout x cutthroat trout, and 1% brook trout. Of the total estimated angler hours, shore anglers made up 71%, boat anglers 28%, and float tube anglers 1% of the total.

We found total fishing pressure between days was virtually the same with 1,591 total h spent on Saturday (May 27) and 1,505 total h spent on Sunday (May 28). Rainbow trout catch rates were better on Saturday (0.28 f/h) than Sunday (0.16 f/h). Many small yellow perch were reported caught and released and are not reflected in the above catch and harvest estimates.

Results of the rotenone treatment are presented in Appendix A.

Goose Lake

We set gill nets in Goose Lake on June 26, 1995, and pulled them the morning of June 27, 1995. We collected 107 fish of which there were 50 rainbow trout, 52 brook trout, 3 westslope cutthroat trout and 3 kokanee. Both the current year's stocking of "put and take" and holdover rainbow trout from the previous years' stocking were collected. Lengths of rainbow trout collected ranged from 180 to 394 mm (Table 13). Condition factors of rainbow trout averaged 1.13 for fish under 310 mm and 0.85 for fish over 310 mm. Brook trout lengths ranged from 175 to 335 mm. Relative weights for brook trout averaged 76.3. A spawning run of kokanee was observed in Goose Creek above the reservoir in September 1995.

Table 13. Length frequencies of fish collected from Goose Lake in June 1995.

Total length (mm)	Total Number Collected			
	Rainbow	Brook	Cutthroat	Kokanee
160	0	0		
170	0	2		
180	0	2		
190	0	4		
200	0	5		
210	1	4		
220	4	11		
230	3	8		
240	2	1		
250	5	5	1	1
260	4	1		1
270	5	1		
280	2	1	1	
290	3	2		
300	3	2		
310	1	1	1	
320	3	1		
330	3	1		
340	3	0		
350	1	0		
360	0	0		
370	4	0		
380	0	0		
390	2	0		

DISCUSSION

Payette Lake

Results of lake trout sampling showed several indications that lake trout in Payette Lake were being over harvested. When length frequencies (Figure 1) and other lake trout data collected in 1994-95 were compared to those collected in 1988 we found some significant changes including:

1. Lake trout recruitment appeared to be very limited. No fish less than 460 mm were collected in 1994-95 even though the number of fish sampled was more than double the number sampled in 1988 (211 in 1994-95, 95 in 1988). Lake trout were last stocked in Payette Lake in 1985. This known date correlated very closely with the ages of the smallest lake trout examined in 1994-95.
2. That the percent of lake trout over 760 mm, collected in 1994/95, was down 33% from that found in 1988. It appeared that harvest of lake trout over 760 mm had changed the population structure.
3. Gill net catch rates of lake trout between 1988 and 1994-95 had fallen from 5.3 fish per night in 1988 to 2.4 fish per night in 1994-95 while using 1988 methods and locations.
4. Our reward tagging studies revealed that in 1988 the exploitation rate of lake trout was around 1.4%. In 1991-92 exploitation was >4% (Janssen et Al. 1994).
5. Comparisons of census results from 1988 and 1995 showed that lake trout catch rates fell from 0.03 f/h in 1988 to 0.025 fish/h in 1995, while pressure had increased from 171 h/d in 1988 to 258 h per day in 1995. While not quantified it was observed that angler species preference had shifted from kokanee in 1988 to lake trout in 1995. Also, while conducting the survey in 1995 we asked anglers if they were in favor of some kind of harvest reduction of large lake trout. The response was 20:1 in favor of some kind of reduction.

After examining all of the above data it was clear the trophy lake trout fishery in Payette Lake was in jeopardy. A regulation was needed that would protect fish over 30 inches from over harvest, and protect young fish because recruitment was very limited. A public opinion survey of Payette Lake, lake trout anglers was made in 1995 to determine if they were in favor of a restrictive lake trout regulation to maintain the trophy lake trout fishery. Of the 21 anglers contacted 20 were in favor of some type of restriction. The recommendation was then made for a daily bag limit of one-fish over 36 inches regulation, which was approved by the Idaho Department of Fish and Game Commission and went into effect January 1, 1996.

The lack of lake trout recruitment prompted biologists to begin a conservative lake trout stocking program. A total of 1,000, 10-inch, adipose fin clipped, lake trout were ordered for stocking in the fall of 1996 or spring of 1997. These fish will be monitored closely to determine their impact on the lake trout and kokanee populations.

Cascade Reservoir

Smallmouth bass growth rates in 1993 (Janssen and Anderson, 1994) indicated that a special regulation may be of benefit to smallmouth bass. Bass growth was good with bass reaching 12 inches in 3-4 years. Few bass greater than 300 mm were collected presumably due to the harvest of these fish.

However, in 1995 we found a bass population with much slower growth rates (Table 10). We then compared growth rates and age class strengths of yellow perch and smallmouth bass using data collected both in this year and data presented in Janssen and Anderson (1994). These data suggested that yellow perch year class strength was a primary factor in smallmouth bass abundance and growth. Years' of weak adult yellow perch age classes allowed for strong age classes of both yellow perch and smallmouth bass to develop in response to low predation by older yellow perch (Figure 9). Smallmouth bass growth doubled the year after a strong age class of yellow perch developed, probably in response to an abundance of small perch available as forage (Figure 9).

Since angling pressure was apparently not the driving force in smallmouth bass growth rate and survival we felt a special regulation for bass was not warranted. While a special regulation would protect bass that grew >12 inches we felt it would slow down growth rates by stock piling large numbers of fish in a limited area of bass habitat. A proposed slot limit would probably benefit smallmouth bass growth during years of high prey abundance. Because of the inconsistencies in the effects of a special bass regulation no changes were made.

RECOMMENDATIONS

1. Continue trawling in Payette Lake to monitor kokanee age class strength.
2. Re-examine lake trout population structure and determine the long term contribution of lake trout stocked in 1997 in Payette Lake in 2000.
3. Continue to monitor nongame fish populations and their effects on rainbow trout in Little Payette Lake.
4. Examine splake in Granite Lake and Upper Payette Lake in 1998 to determine stocking needs.
5. Make no changes in the bass regulation on Cascade Reservoir.

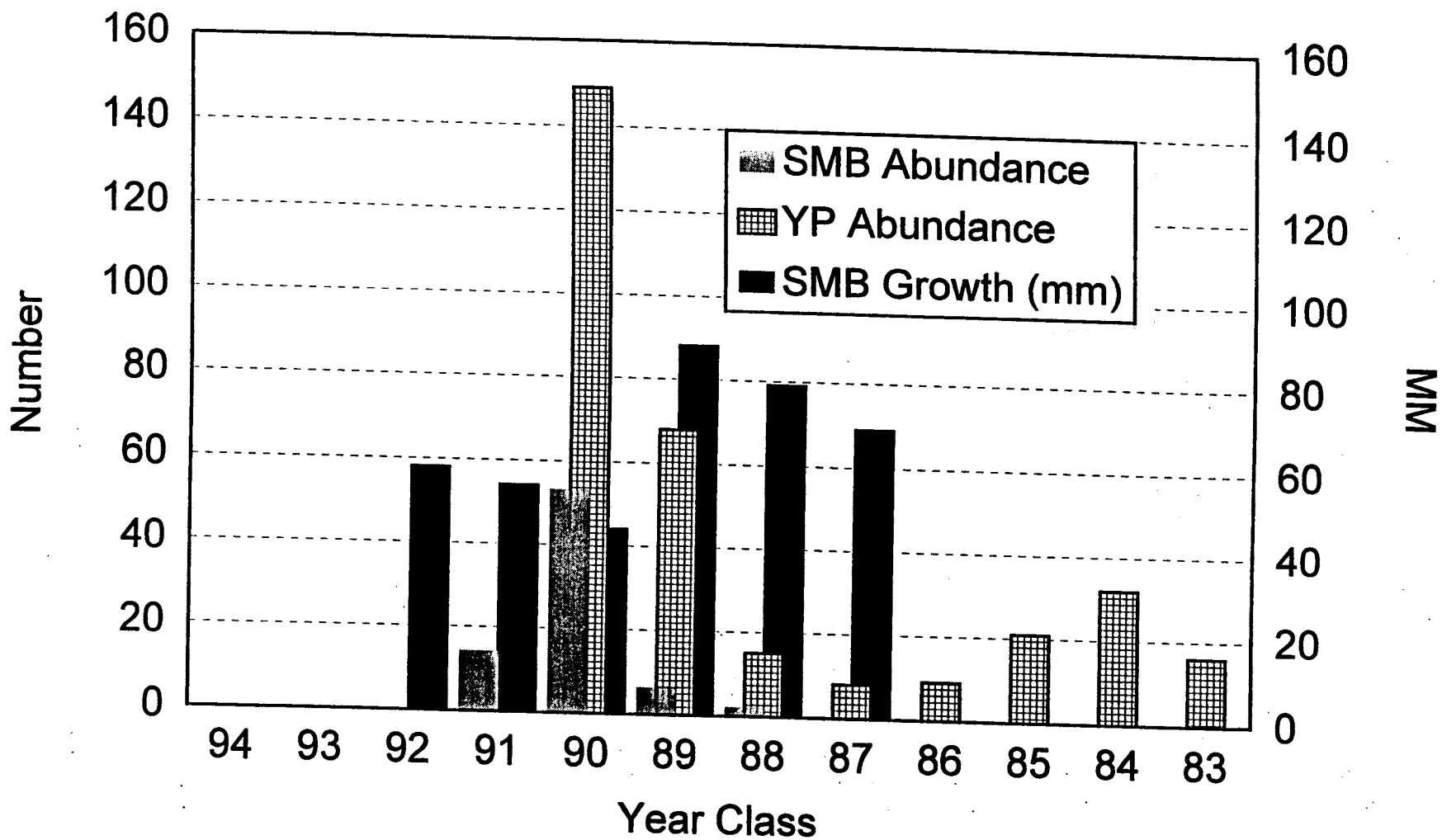


Figure 9. Comparison of Cascade Reservoir yellow perch and smallmouth bass abundance by age class, and smallmouth bass growth rates by age class.

LITERATURE CITED

- Bowles, E. C., V. L. Ellis, C. Hatch, and D. Irving. 1986. Kokanee stock status and contribution of Cabinet Gorge Hatchery, Lake Pend Oreille, Idaho. Annual Progress Report FY 1985. Agreement No. DE-A179-85BP22493. Project. 85-339.
- Bowles, E. C., V. L. Ellis, C. Hatch, and D. Irving. 1987. Kokanee stock status and contribution of Cabinet Gorge Hatchery, Lake Pend Oreille, Idaho. Annual Progress Report FY 1986. Agreement No. DE-A179-85BP22493. Project No. 85-339.
- Grunder, S. A., J. D. Linman, and D. R. Anderson. 1990. Federal aid in fish restoration. Regional fishery management investigations. Job performance report, Project F-71-R-13. Idaho Department of Fish and Game, Boise.
- Grunder, S. A., J. D. Linman, and D. R. Anderson. 1991. Federal aid in fish restoration. Regional fishery management investigations. Job performance report, Project F-71-R-14. Idaho Department of Fish and Game, Boise.
- Janssen, P.J., and D.R. Anderson. 1992. Federal aid in fish restoration. Regional fishery management investigations. Job performance report, Project F-71-R-15. Idaho Department of Fish and Game, Boise.
- Janssen, P.J., and D.R. Anderson. 1994. Federal aid in fish restoration. Regional fishery management investigations. Job performance report, Project F-71-R-16. Idaho Department of Fish and Game, Boise.
- Janssen, P.J., D.R. Anderson and J. Patterson. 1994. Federal aid in fish restoration. Regional fishery management investigations. Job performance report, Project F-71-R-17. Idaho Department of Fish and Game, Boise, Idaho.
- McArthur, T.S., T. Reece, and N. Boydstun. 1993. Statewide angler opinion and harvest surveys: Creel census system. Job Completion Report, Project F-73-R-15, Subproject I, Study I. Idaho Department of Fish and Game, Boise.
- Janssen, P.J., and D.R. Anderson. 1996. Federal aid in fish restoration. Regional fishery management investigations. Job performance report, Project F-71-R-18. Idaho Department of Fish and Game, Boise.
- Piccolo, J.J., W.A. Hubert, and R.A. Whaley. 1993. Standard weight equation for lake trout. North American Journal of Fisheries Management 13(2):401-404.

APPENDIX

APPLICATION FOR SHORT-TERM ACTIVITY EXEMPTION

Applicant: Idaho Department of Fish and Game (IDFG)
Contact Person Don Anderson, 634-8137
Body of Water: Horsethief Reservoir
Tributary To: Big Creek (North Fork Payette River)
Objective: To chemically eradicate stunted yellow perch and restock with rainbow trout
Date: October 3, 1995

Evidence of protection or promotion of public interest

Horsethief Reservoir is owned and operated by the Idaho Department of Fish and Game (IDFG). It was constructed in 1963 and is managed as a trout fishery. The reservoir is maintained at a full pool year around. At full pool the reservoir contains 4,900 acre-feet of water with a surface area of 270 acres. Rainbow trout, cutthroat xx rainbow hybrids, brown trout and splake (lake trout x brook trout hybrid) are stocked annually to maintain the trout fishery in Horsethief Reservoir.

Yellow perch were first reported in Horsethief Reservoir in 1981, the result of an illegal introduction. By 1983 they totally dominated the fishery and were then chemically eradicated with Rotenone in the fall of 1983. Following treatment the reservoir was restocked with trout and trout fishing was again excellent until 1993.

In 1993, yellow perch were again reported being caught in Horsethief Reservoir. In 1994 the IDFG completed a fish survey on Horsethief Reservoir. We sampled 323 fish of four species. These included yellow perch, rainbow trout, brown trout and splake. Yellow perch, rainbow trout, brown trout and splake made up 88%, 8.5%, 2% and 1.5% respectively. Expressed as biomass, these same four species made up 51.5%, 29.6%, 12.8%, and 6% respectively.

Yellow perch ranged in length from 65 to 235 mm with the largest number of fish in the range of 65 to 90 mm. Fish ageing demonstrated that three age classes of yellow perch had been collected. The strongest age class in numbers was age 0. From the aging, we could determine the presence of yellow perch was again the result of illegal introductions.

In 1995, trout fishing deteriorated rapidly. Yellow perch in the 5-6 inch range dominated the fishery. Angling pressure dropped significantly due to poor trout fishing. Yellow perch severely impacted

Appendix A. Continued.

growth and survival rates of trout in Horsethief as well as simply interfering with trout anglers (perch taking the bait before a trout has a chance).

Public meetings were held in Cascade, Nampa, and Boise, Idaho between March 10-15, 1995 to inform the public of the situation and to present our plans to treat the reservoir with rotenone in the fall of 1995. The consensus of all people present was to go ahead with the chemical renovation. There were no negative opinions expressed.

Prevention of long-term injury to beneficial use

The IDFG plans to restock Horsethief Reservoir in the spring of 1996 with catchable size rainbow trout and brown trout to provide an immediate fishery. Additionally we will stock fingerling rainbows and hybrids in the summer of 1996.

The reservoir will start to be drained on August 15, 1995 and is expected to completely drain by mid to late September. As in the last treatment in 1983, only the stream channel and scattered pot holes are expected to retain water.

The main channel will be treated with a drip station located above the road culvert on Horsethief Creek. The reservoir outlet valve will be closed when the chemical is first detected near the valve. Once closed the remaining pool will then be treated. Backpack sprayers will be utilized to treat small pockets of water and spring areas that would otherwise be isolated from the chemical.

The total treatment of the channel, pool and spring areas is expected to take approximately 120 liters of Chem-fish or Noxfish toxicant. However, exact flows and volume of remaining pool will not be known until just before the treatment. After the reservoir is drained, we will measure flows in Horsethief Creek and the volume of the remaining pool. These will then be treated at a rotenone concentration of 1.0 ppm. *In situ* serial dilution, bio assays of Roussel Biocorp Noxfish, performed by IDFG in 1992 in Lost Valley Reservoir, indicated a concentration of 0.25 to .5 ppm was needed for a complete kill of yellow perch. However, when there are large amounts of aquatic vegetation and turbidity in the water being treated these concentrations need to be increased significantly. Since Horsethief Reservoir has a very large aquatic weed infestation, we have elected to treat at a 1 ppm concentration.

We expect some minor leakage out of the outlet structure, therefore, we expect to kill fish in the channel below the reservoir for approximately ¾ mile, where Horsethief Creek enters Big Creek. Once the chemical enters Big Creek it will be diluted enough to not threaten fish downstream.

HORSETHIEF RESERVOIR RENOVATION

Application Report

Idaho Department of fish and Game personnel chemically eradicated Horsethief Reservoir on October 4, 1995. The personnel included:

- ▶ Don Anderson, Regional Fisheries Manager
- ▶ Paul Janssen, Regional Fisheries Biologist

- ▶ Kim Apperson, Regional Fisheries Biologist
- ▶ Gene McPherson, Fish Hatchery Superintendent III
- ▶ Steve Kammeyer, Fish Hatchery Superintendent I

We applied a total of 1 $\frac{3}{4}$ gallons of CHEM-FISH SYNERGIZED, a 2 $\frac{1}{2}$ % rotenone solution, to the inlet, isolated ponds within the reservoir perimeter, and various seeps and springs.

In preparation of the treatment, fish salvage was authorized in early-August. The valve at the dam was opened August 15 and adjusted such that the stream channel below the dam was filled to bank full. The discharge was closely monitored and maintained at a constant release to supply a consistent flow to downstream irrigators. The reservoir was completely drained by September 25, leaving only the Horsethief Creek channel, a shallow, two to three-acre pond and a few muddy seep areas. Several beaver dams were removed upstream from the reservoir to eliminate sanctuaries. We partially drained the small pond by shoveling the constrictions in its' outlet.

An eight-hour drip station was installed at the second culvert above the reservoir on Horsethief Creek. It was calibrated and adjusted to dispense one gallon of CHEM-FISH to 3.4 cfs of flow over an eight-hour period to make a concentration of one ppm. The solution was marked with fluorescein dye, but the marker was visible for only a short distance and was not helpful.

Three bladderbag-type hand sprayers were each loaded with 0.25 gallons of CHEM-FISH and filled with water. Two people walked the Horsethief Creek channel from the drip station to the dam spraying the toxicant into isolated ponds, seep areas, and in-flowing springs. One person used a hand sprayer to apply CHEM-FISH to a small inlet entering from the north and to the shallow, two to three-acre pond just west of "Florida Point."

The outlet valve was closed prior to the toxicant reaching the dam. No dead or dying fish were observed by the people using the hand sprayers. A few distressed fish were reported near the dam on October 4, but no dead fish were documented during a comprehensive post treatment survey on October 5. Many gulls were observed during and after the treatment and presumably explain why no dead fish were seen. We also believe that nearly all of the fish left the reservoir during the draining process and/or were taken by predators prior to the treatment. We believe we attained a total kill within the treatment area. Future treatments (if needed) should be accomplished in a similar manner to this treatment.

1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project I: Surveys and Inventories

Subproject I-C: Southwest Region (McCall)

Job: c

Title: Rivers and Streams Investigations

Contract Period: July 1, 1995 to June 30s 1996

ABSTRACT

We estimated the 1995 kokanee *Oncorhynchus nerka kennerlyi* spawning run in the North Fork Payette River above Payette Lake to be 55,446 fish.

We snorkeled four previously established transects on the lower South Fork Salmon River to monitor westslope cutthroat trout *O. clarki* abundance. We found an average of 0.39 westslope cutthroat trout per transect.

We completed standard Idaho Department of Fish and Game stream surveys on four streams; Lodgepole Creek, Warm Lake Creek, Poorman Creek, and Tyndall Creek. Brook trout *Salvelinus fontinalis* were collected from Poorman, Lodgepole, and Warm Lake creeks. Westslope cutthroat trout were collected from Poorman Creek, and rainbow trout *O. mykiss* were collected from Lodgepole and Tyndall creeks. Sand was the dominant bottom substrate in all four streams, with Tyndall Creek being the most heavily impacted at 80%.

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OBJECTIVE

To maintain information for fishery management activities and decisions in McCall area rivers and streams.

INTRODUCTION

North Fork Payette River above Payette Lake

The spawning run of kokanee *Oncorhynchus nerka kennerlyi* in the North Fork Payette River (NFPR) from Payette Lake has been monitored since 1988 to assess spawning escapement. It also serves as a method of validating kokanee population and density estimates and survival estimates from trawling (Janssen et al. 1995). The spawning run was monitored again in 1995.

South Fork Salmon River (below the Secesh River confluence)

Cutthroat trout *Oncorhynchus clarki* fishing regulations on the South Fork Salmon River (SFSR) drainage changed in 1984 from a six-fish limit to a one-fish limit. In 1986 the fishing regulation for cutthroat trout changed again to catch-and-release fishing only. The lower SFSR fish community (below the Secesh River confluence) had not been examined since 1986 (Anderson et al. 1987). The upper four transects of the lower SFSR were sampled in 1993 and results were presented in Janssen and Anderson (1997). We conducted surveys on the lower four transects in 1995, completing the survey of the lower SFSR. This study was used to assess how the westslope cutthroat trout population below the Secesh River confluence responded to these regulation changes.

Standard Stream Surveys

We completed four standard stream surveys in 1995; three were on tributaries to the upper South Fork Salmon River (SFSR): Tyndall Creek, Lodgepole Creek, and Warm Lake Creek. The fourth stream surveyed was Poorman Creek, a tributary to Boulder Creek.

South Fork Salmon River Guided Fishery

Wapiti Ranch guides catch-and-release fishing on a section of the South Fork Salmon River from the Hamilton Creek to Threemile Creek, down river from the confluence with the Secesh River. The outfitter is required to report effort and catch. Annual reports will allow us to track trends in this fishery.

Upper Little Salmon River Temperature Monitoring

The upper Little Salmon River drainage is the focus of ongoing riparian habitat improvement projects and some improvements in agricultural land use practices. Debate has risen regarding what specific factors limit salmonid populations in the drainage. The effect of high summer water temperature as a factor limiting salmonid abundance and distribution in the drainage is unknown. The recent availability of affordable temperature recorders made it possible to continuously monitor summer temperatures. Monitoring began in 1994.

METHODS

North Fork Payette River above Payette Lake

We visually counted all spawning kokanee on six days between September 9 and October 11, 1995. The total spawning run estimate was made by multiplying the largest daily, live spawner count by 1.73 (Frost and Bennett 1994).

South Fork Salmon River (below the Secesh River confluence)

We snorkeled four previously established transects on the lower SFSR. The transects were located from the Hettinger Ranch, downstream to the mouth of the SFSR at Mackay Bar. The transect locations were described in Anderson et al. (1987). Transects sampled were numbered and named; 24- Little Flat Creek, 25-Knob Creek, 26-Rooster Creek, and 28-Badley Creek, as referenced in Anderson et al. (1987).

We sampled each transect using two snorkelers that floated downstream. Snorkelers recorded each species of fish and estimated size to the nearest inch. Length of the transect(t) and underwater visibility(v) were also measured. These figures were used in the formula $((t*v*2)* \text{the number of snorkelers})$ to determine the area sampled in each transect.

Standard Stream Surveys

We used Idaho Department of Fish Game standard stream survey methodology presented in the August 15, 1994, Standard Stream Survey Memo from Bill Horton, State Fish Management Coordinator, to conduct these surveys. Fish were sampled with electrofishing gear. One pass was made to assess species presence/absence.

South Fork Salmon River Guided Fishery

We provided Wapiti Meadows Ranch with angler diaries made specifically for monitoring this fishery. Guides were asked to have clients record time fished, species caught, and fish length to the nearest inch. There was also space provided in the diary for comments, and an opportunity for the angler to have his or her diary returned after analysis.

Upper Little Salmon River Temperature Monitoring

Three temperature recorders (Hobo model HTI -5 to +35°C) monitored water temperature continuously, recording a temperature every 2.4 h from June 29 through October 1, 1995. The upstream recorder (Station 1) was placed under the bridge on Hubbard Lane, approximately 500 m upstream from the irrigation diversion. Station 2 was approximately 50 m downstream from the Meadow Creek subdivision bridge, adjacent to Highway 95 road mile 163.4 and at 45°N Latitude. Station 3 was adjacent to Highway 95, 8.7 km north of the intersection with Highway 55, under a recently constructed bridge on Alvin Hall's ranch. Station 3 was approximately 800 m upriver from its location in 1994. All recorders were in water tight ABS containers and secured to a four-foot rebar driven into the substrate to hold the recorder in the middle of the water column.

RESULTS

North Fork Payette River above Payette Lake

The kokanee spawning run was unusually late in 1995. We observed the first kokanee on September 8. The spawning fish count totals, obtained by walking the stream are given in Tables 1 and 2. The peak count was 32,050 live fish on September 26, 1995. The total spawning run estimate for 1995 was 55,450 fish. Average fork length and weight of post spawned fish was 249 mm and 164 g for males and 236 mm and 117 g for females.

South Fork Salmon River Guided Fishery

We received information from guided trips that took place from July 5 through August 24. Steelhead/redband trout *O. Mykiss*, westslope cutthroat trout *O. clarki lewisi*, mountain whitefish *Prosopium williamsoni*, and brook trout *Salvelinus fontinalis* were reported in the catch (Table 3). Catch rate for all species combined was 1.2 fish/h in both the South Fork Salmon River and East Fork South Fork Salmon River. Steelhead parr/redband trout dominated the catch in 1995.

Table 1. Stream bank counts of spawning kokanee in the North Fork Payette River above Payette Lake in 1995.

Date	Number Live Fish	Total Run Estimate ^a
09/11	5,250	--
09/14	12,900	--
09/18	15,730	--
09/22	31,440	--
09/26	32,050	55,446
10/02	24,380	--
^a Run estimate is calculated by multiplying the highest total live fish count by 1.73 (Frost and Bennett 1995).		

Table 2. Total estimated kokanee spawning run sizes in the North Fork Payette River, Payette Lake biomass estimates of spawners (1,715 ha, area of lake >40 ft depth), and estimated number of spawners/lake ha (1,715) using peak spawning counts of live fish, multiplied by 1.73 (Frost and Bennett 1994).

Year	Peak Count	Estimated Number of Spawners	Kg/ha	Number/ha	Average Weight/Fish (g)
1988	13,200	22,800	4.6	13.3	346
1989	8,400	14,500	2.9	8.4	349
1990	9,642	16,700	3.5	9.7	358
1991	10,400	18,000	5.3	10.5	505
1992	16,945	29,300	6.4	17.1	377
1993	34,994	59,310 ^a	8.5	34.6	245
1994	25,550	44,200	5.5	25.8	214 ^b
1995	32,050	55,450	4.8	32.3	147.5
^a Estimate made from shore and weir counts (Frost and Bennett 1994).					
^b From gill net data of captured spawners in Payette Lake during lake survey.					

Table 3. Fish caught and released during guided angling trips with Wapiti Meadows Ranch Outfitters, South Fork Salmon River down river from the East Fork South Fork Salmon River confluence, and East Fork South Fork Salmon River, 1995.

Fish length (inches)	South Fork Salmon River				EFSF Salmon River	
	Steelhead/ redband trout	Westslope cutthroat trout	Mountain whitefish	Brook trout	Steelhead/ redband trout	Westslope cutthroat trout
4	5	0			2	
5	16	7			8	
6	59	13			20	
7	32	6		1	13	1
8	36	6			15	2
9	15	7			7	
10	23	11			6	3
11	10	2			1	
12	11	12			2	2
13	3	8	1		1	2
14		12	2		1	
15		14				1
16		10				2
17		1				
18		1				
19	1					
20						
21						
22						
23						
24						
25		1				
Total	211	111	3	1	76	13

Upper Little Salmon River Temperature Monitoring

Recorders successfully monitored river temperatures from June 29 through October 1. Average daily river temperatures for July ranged from 14.3 to 21.5°C (Appendix A and B). Average daily temperatures for August ranged from 14.2 to 22.3°C. Minimum daily temperature did not exceed 19.6°C. Maximum temperatures exceeded 20°C for >6 h on 38/95 days at Station 1; 23/95 days at Station 2; and 38/95 days at Station 3.

South Fork Salmon River (below the Secesh River confluence)

We observed by snorkeling a total of eight westslope cutthroat trout (Tables 4 and 5) that ranged in size from 7 to 12 inches in the four transects. The most abundant species observed were wild rainbow trout/steelhead. We observed only three age-0 chinook salmon *O. tshawytscha* in one of the four transects. No bull trout *S. confluentus* were observed in any of the transects. Snorkeling visibility was limited due to a large amount of suspended solids in the river, resulting from a debris flood in Rock Creek and Elk Creek 2-3 weeks prior to our work.

Table 4. 1995 South Fork Salmon River snorkel transect physical data.

Transect Number	Location	Number of Snorkelers	Transect Length (m)	Transect Visibility (m)	Corridor Area (m ²)
24	Little Flat Cr.	2	158	2.5	1,580
25	Knob Cr.	2	95	2.2	836
26	Rooster Cr.	2	90.5	2.3	832
28	Badley Cr.	2	109	2.5	1,090

Table 5. Fish numbers per 100 m² by species and size observed during snorkel transects in the SFSR in 1995.

Length Class (inches)	Rainbow				Cutthroat				Bull Trout				Adult Whitefish				Age 0 Chinook			
	Transect Number				Transect Number				Transect Number				Transect Number				Transect Number			
	24	25	26	28	24	25	26	28	24	25	26	28	24	25	26	28	24	25	26	28
3	0	0.24	0	0	0	0	0	0	0	0	0	0	No individual lengths estimated				No individual lengths estimated			
4	0	0.47	0	0	0	0	0	0	0	0	0	0								
5	0	0.12	0.36	0	0	0	0	0	0	0	0	0								
6	0.06	0.60	0.48	0	0	0	0	0	0	0	0	0								
7	0	0	0.36	0	0	0	0	0.18	0	0	0	0								
8	0.13	0.35	0	0	0.06	0	0	0	0	0	0	0								
9	0	0.36	0	0	0	0	0	0	0	0	0	0								
10	0	0.24	0.12	0	0.06	0	0.24	0	0	0	0	0								
11	0	0	0	0	0	0	0.12	0	0	0	0	0								
12	0	0.11	0	0	0	0.12	0	0	0	0	0	0								
>12	0	0	0	0.18	0	0	0	0	0	0	0	0								
Total	0.19	02.5	1.32	0.18	0.12	0.12	0.36	0.18	0	0	0	0	0	0.48	0.49	0.46	0	0.36	0	0

Standard Stream Surveys

Completed IDFG Standard Stream Survey data forms for each stream survey are presented in Appendix C. Fish were found in all four streams surveyed: 8 brook trout and 3 westslope cutthroat trout from Poorman Creek; 24 brook trout from Warm Lake Creek; 2 brook trout, 3 rainbow trout and sculpin *Cottus sp.* from Lodgepole Creek; and 1 rainbow trout from Tyndall Creek.

Tyndall Creek was found to be severely impacted by sand which made up an estimated 80% of the bottom substrate. Lodgepole Creek, Warm Creek, and Poorman Creek were found to be moderately to heavily impacted with sand with averages of 65%, 51% and 62.5% respectively.

DISCUSSION

South Fork Salmon River (below the Secesh River confluence)

It appeared that westslope cutthroat trout numbers had changed little since the last study was completed in 1986. However, due to an oversight, sampling techniques were different between the two years. This made it difficult to detect small changes in westslope cutthroat trout numbers. The entire width of the river was used to determine the area of stream sampled in 1986. Biologists used visibility measurements to determine the area of stream sampled in 1995. Therefore, westslope cutthroat trout densities appeared to be higher in 1995 when they probably were not.

South Fork Salmon River Guided Fishery

Angler catch rate was lower in 1995 (1.2 fish/h) than reported in 1994 (2.3 fish/h), the first year of monitoring. Also, large westslope cutthroat trout were less prevalent in the 1995 catch. Year-to-year variation in this fishery may be due to many factors. Information representative of trends in the fishery and fish populations will only be gained over several years of monitoring.

Upper Little Salmon River Temperature Monitoring

Summer river temperatures were noticeably cooler in 1995 than 1994, the first year of monitoring, but maximum temperatures continued to rise above 20°C for several hours each day from early July through mid-August. A consistent pattern is developing with regard to differences in temperatures among the stations. Station 2 continued to be the coolest, probably because of the local effect from Goose Creek inflow. In 1995, Station 3 was moved upriver approximately 800 m under a newly constructed bridge, where it remained shaded and in flowing water throughout the monitoring period. In 1994, Station 3 was located at the outside of a meander, and at low flows was in still water. The new location is more representative of salmonid habitat. Stations 1 and 2 are appropriate sites to continue to monitor because temperature recorders

remain shaded and in flowing water. The Bureau of Land Management maintains temperature recorders in the river from Round Valley Creek to the confluence with the Salmon River. No additional sites should be needed to characterize river temperatures throughout the mainstem Little Salmon River. Summer temperature monitoring will continue indefinitely to identify trends with weather, flow regime, and recovery of the riparian community.

RECOMMENDATIONS

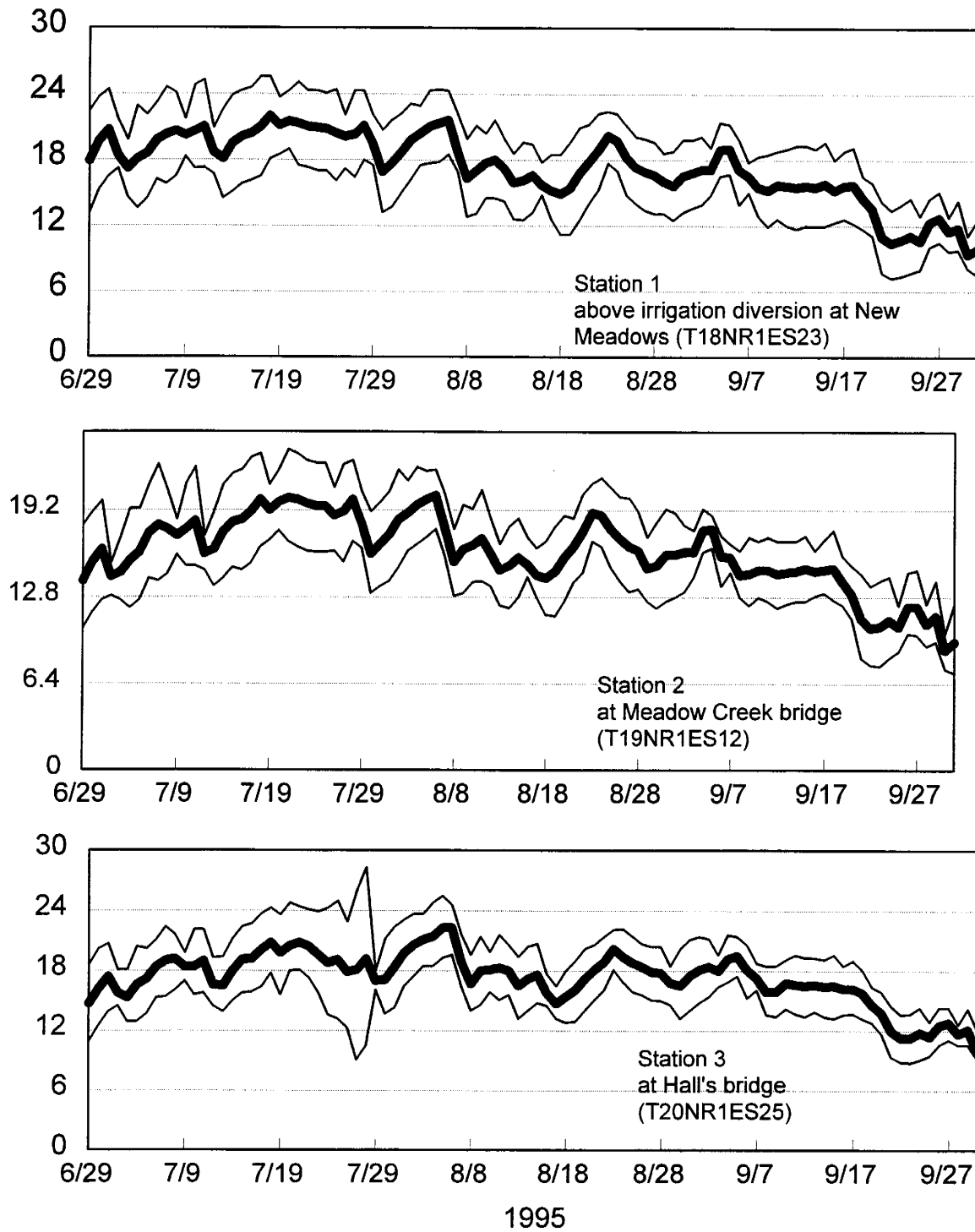
1. Continue kokanee spawner counts in the North Fork Payette River to monitor Payette Lake kokanee stocks and to help calibrate kokanee trawling work.
2. Repeat South Fork Salmon River cutthroat survey in five to ten years.
3. The guided fishery in the South Fork Salmon River should be monitored annually as in 1994 and 1995. Snorkel sites established in 1994 should be surveyed when flow conditions allow.
4. We should continue to monitor summer river temperatures in the Little Salmon River on an annual basis. This will create a long-term database to evaluate changes in river temperature with recovery of the riparian community.

LITERATURE CITED

- Anderson, D.R., D. Scully, J. Hall-Griswold and B. Arnsberg. 1987. Regional fisheries management investigations, Federal aid in fish restoration. Job performance report. Project F-71-R-11. Idaho Department of Fish and Game.
- Frost, F.O. and D.H. Bennett. 1994. Determination of kokanee incubation success, potential egg deposition, and fry production from the North Fork Payette River, Idaho. Annual Report. Department of Fish and Wildlife Resources. College of Forestry, Wildlife and Range Sciences. University of Idaho. Moscow, Idaho.
- Janssen, P.J., D.R. Anderson and J. Patterson. 1997. Regional fishery management investigations. Federal aid in fish restoration. Job performance report, Project F-71-R-18. Idaho Department of Fish and Game.

APPENDICES

Appendix A. Daily mean, minimum, and maximum water temperatures in the Little Salmon River, Idaho, 1995.



Appendix B. Daily mean, maximum, and minimum river temperatures (C°), upper Little Salmon River, 1995.

DATE	Station 1			Station 2			Station 3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
6/29/95	17.90	22.40	13.20	14.00	18.10	10.50	14.70	18.60	10.90
6/30/95	19.70	23.70	15.30	15.40	19.10	11.70	16.20	20.20	12.50
7/1/95	20.70	24.40	16.50	16.30	19.90	12.60	17.40	20.70	13.90
7/2/95	18.40	21.70	17.20	14.30	15.30	12.90	15.80	18.10	14.50
7/3/95	17.20	19.80	14.60	14.60	17.20	12.60	15.30	18.10	12.90
7/4/95	18.10	22.90	13.60	15.50	19.30	12.00	16.60	20.40	12.90
7/5/95	18.60	22.10	14.50	16.10	19.30	12.60	17.20	20.20	13.70
7/6/95	19.80	23.20	16.20	17.50	21.10	14.20	18.40	21.10	15.30
7/7/95	20.30	24.60	15.80	18.10	22.60	14.00	19.00	22.40	15.40
7/8/95	20.60	24.10	16.50	17.80	20.70	14.50	19.20	21.60	16.10
7/9/95	20.20	21.70	18.30	17.30	18.50	15.90	18.40	19.80	17.00
7/10/95	20.60	24.80	17.20	17.80	21.20	15.10	18.40	22.10	15.60
7/11/95	21.00	25.30	17.30	18.40	22.40	15.10	19.00	22.10	15.80
7/12/95	18.70	20.90	16.70	16.00	17.30	14.80	16.60	19.30	14.50
7/13/95	18.10	22.60	14.50	16.30	19.10	13.60	16.50	19.40	13.90
7/14/95	19.50	23.90	15.10	17.60	21.10	14.20	18.00	21.20	15.00
7/15/95	20.10	24.30	15.80	18.30	21.90	15.00	19.10	22.40	15.80
7/16/95	20.40	24.60	16.10	18.50	22.20	14.80	19.20	22.70	15.90
7/17/95	21.00	25.60	16.50	19.10	23.10	15.30	20.10	23.70	16.40
7/18/95	22.00	25.60	18.10	20.00	23.40	16.50	20.80	24.30	17.80
7/19/95	21.10	23.70	18.50	19.20	21.10	17.00	19.80	23.60	15.60
7/20/95	21.50	24.30	19.00	19.80	22.20	17.70	20.50	24.80	18.00
7/21/95	21.30	25.10	17.50	20.10	23.70	16.90	20.80	24.40	18.10
7/22/95	21.00	24.30	17.30	20.00	23.40	16.50	20.40	24.10	17.30
7/23/95	20.90	24.30	17.00	19.70	22.90	16.20	19.60	23.90	15.80
7/24/95	20.80	24.10	17.00	19.50	22.70	16.10	18.80	24.30	13.60
7/25/95	20.40	24.40	16.10	19.50	22.70	16.10	19.10	25.00	13.20
7/26/95	20.10	22.10	17.20	18.80	20.90	16.20	17.90	22.90	12.30
7/27/95	20.30	24.30	16.40	19.10	22.60	15.40	18.10	26.00	9.10
7/28/95	21.10	24.30	18.00	20.00	22.90	16.90	19.20	28.30	10.50
7/29/95	19.40	22.10	17.50	18.20	20.60	16.40	17.00	18.00	16.10
7/30/95	16.90	20.70	13.20	16.00	19.10	13.10	17.10	21.20	13.70
7/31/95	17.70	21.60	13.70	16.70	19.80	13.60	18.40	22.40	14.30
8/1/95	18.70	22.20	15.00	17.40	20.60	14.00	19.80	23.10	16.50

Appendix B. Continued.

DATE	Station 1			Station 2			Station 3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
8/2/95	19.80	23.10	16.20	18.50	22.20	15.00	20.60	23.70	17.50
8/3/95	20.40	22.90	17.50	19.00	21.40	16.20	21.10	23.70	18.50
8/4/95	21.00	24.30	17.70	19.60	22.40	16.70	21.40	24.80	18.50
8/5/95	21.30	24.40	17.80	20.00	22.10	17.20	22.30	25.50	19.30
8/6/95	21.60	24.30	18.50	20.30	22.20	17.80	22.30	24.60	19.60
8/7/95	18.70	22.20	16.90	17.90	20.40	15.80	18.90	21.60	16.40
8/8/95	16.30	19.90	12.80	15.40	17.80	12.90	16.70	19.60	14.00
8/9/95	17.00	21.10	13.10	16.30	19.60	13.10	18.00	21.40	14.60
8/10/95	17.70	20.40	14.50	16.60	19.30	13.90	18.10	19.90	15.90
8/11/95	18.00	21.60	14.50	17.10	20.70	14.00	18.30	21.60	15.10
8/12/95	17.20	19.90	14.20	16.00	18.60	13.60	18.00	20.60	15.60
8/13/95	15.90	18.60	12.60	14.80	16.70	12.20	16.50	19.40	13.20
8/14/95	16.10	19.60	12.50	15.10	18.00	12.00	17.20	20.40	14.00
8/15/95	16.60	19.40	13.20	15.70	18.60	12.80	17.60	20.70	14.80
8/16/95	15.70	17.80	14.80	15.20	17.20	14.30	15.80	17.70	14.50
8/17/95	15.20	18.50	12.60	14.40	16.40	12.80	14.70	16.50	13.20
8/18/95	14.90	18.50	11.20	14.20	16.90	11.50	15.40	18.00	12.80
8/19/95	15.40	19.60	11.20	14.70	18.00	11.40	16.10	19.00	12.90
8/20/95	16.80	20.90	12.50	15.70	18.80	12.50	17.20	20.20	14.00
8/21/95	17.80	21.20	14.00	16.50	18.60	13.90	18.10	20.60	15.10
8/22/95	18.90	22.20	15.30	17.60	20.40	14.60	18.90	21.40	16.10
8/23/95	20.20	22.40	17.70	19.00	21.20	16.90	20.20	22.10	18.10
8/24/95	19.70	22.20	17.00	18.80	21.60	16.50	19.40	22.20	16.90
8/25/95	18.20	21.10	14.80	17.80	20.90	15.00	18.80	21.40	15.90
8/26/95	17.30	20.10	14.00	17.10	20.20	14.00	18.40	20.70	15.60
8/27/95	16.90	19.90	13.40	16.50	20.10	13.20	17.90	20.40	15.10
8/28/95	16.60	19.60	13.10	16.20	19.10	13.40	17.80	20.40	15.00
8/29/95	16.00	18.60	13.10	14.90	17.20	12.50	16.80	18.50	14.60
8/30/95	15.60	18.80	12.50	15.10	18.30	12.00	16.50	20.20	13.20
8/31/95	16.50	19.80	13.20	15.90	19.30	12.50	17.50	21.10	14.00
9/1/95	16.80	19.80	13.60	15.90	19.00	12.80	18.10	21.40	14.80
9/2/95	17.10	20.10	13.90	16.10	18.10	13.20	18.40	21.20	15.40
9/3/95	17.10	19.10	14.80	16.10	17.70	14.30	18.00	19.60	16.40
9/4/95	18.90	21.40	16.50	17.70	19.30	16.10	19.20	21.60	16.90
9/5/95	19.00	21.20	16.70	17.80	18.80	16.40	19.50	21.40	17.50
9/6/95	17.10	19.80	13.90	15.80	17.30	13.60	18.10	20.60	15.30
9/7/95	16.50	17.80	15.00	15.70	16.70	14.60	17.30	18.80	16.10

Appendix B. Continued

DATE	Station 1			Station 2			Station 3		
	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN
9/8/95	15.50	18.30	12.90	14.40	16.20	12.80	15.90	18.50	13.60
9/9/95	15.20	18.50	11.90	14.50	17.20	12.20	15.90	18.50	13.40
9/10/95	15.70	18.80	12.60	14.80	16.90	12.80	16.80	19.10	14.20
9/11/95	15.60	19.00	12.00	14.80	17.20	12.50	16.60	19.60	13.70
9/12/95	15.50	19.30	11.70	14.50	16.90	12.00	16.50	19.30	13.40
9/13/95	15.60	19.30	12.00	14.60	16.90	12.30	16.60	19.30	13.90
9/14/95	15.50	19.00	11.90	14.70	16.90	12.50	16.40	19.10	13.40
9/15/95	15.80	19.60	12.00	14.90	17.30	12.50	16.50	19.60	13.20
9/16/95	15.20	18.00	12.30	14.70	16.20	12.90	16.20	18.50	13.60
9/17/95	15.60	18.80	12.60	14.80	17.00	13.10	16.20	19.00	13.70
9/18/95	15.70	19.10	12.20	14.90	17.70	12.60	15.80	18.10	13.20
9/19/95	14.50	16.50	11.70	13.90	15.80	12.20	14.60	16.40	12.80
9/20/95	13.50	15.90	11.10	13.00	15.10	11.20	13.80	15.90	11.70
9/21/95	11.00	14.20	7.70	11.20	14.50	8.30	12.00	14.50	9.40
9/22/95	10.40	13.40	7.20	10.50	13.60	7.80	11.30	13.60	8.90
9/23/95	10.70	13.90	7.40	10.60	14.00	7.70	11.30	13.70	8.80
9/24/95	11.10	14.50	7.70	11.10	14.30	8.30	11.80	14.30	9.10
9/25/95	10.60	12.90	8.00	10.60	12.20	8.80	11.40	12.90	9.50
9/26/95	12.30	14.50	10.10	12.10	14.60	10.10	12.50	14.30	10.60
9/27/95	12.70	15.10	10.50	12.10	14.80	10.00	12.80	14.30	11.10
9/28/95	11.50	12.80	9.70	10.80	12.30	9.20	11.70	12.60	10.60
9/29/95	11.80	14.30	9.80	11.40	14.00	9.50	12.10	14.20	10.60
9/30/95	9.40	11.10	8.10	8.90	10.10	7.50	9.90	12.00	9.10
10/1/95	9.90	12.50	7.50	9.50	12.30	7.20	9.90	11.50	8.10

IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEYS

FISH SURVEY DATA

Stream POORMAN Cr Date 7/6/95 Survey Crew JANSSEN

Agency: Idaho Department of Fish and Game

IDFG Region: (circle your region) R-1, R-2, R-3, R-M, R-4, R-5, R-6, R-7

Stratum 1 Transect 1

Channel Type: B, C, Other

Section Type: monitoring, chinook sup., steelhead sup., evaluation

Quad Map ITO-McCall

UTM x/y 11T 0578704 44° 53.0
4970496 116° 00.

EPA Reach # 17050123 025

Length 284 ft Transect Widths 8, 6.3, 5.8, 5.4 ft

H₂O Temp. 52°F Time 1630 Mean Width 6.375 ft

Conductivity 76 μ S Transect Area 1810.5 ft

Corridor visibility ____m

Methods: () Snorkel (circle corridor or entire stream width)

(X) Electrofishing

() Other _____

Habitat Type: (circle one) Pool, Riffle, Run/glide, Pocket Water

IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEY

TRANSECT DESCRIPTION SHEET

Stream POORMAN Cr. Date 7/6/95
EPA Reach Number 17050123 025 IDFG Region 3 McCall
Survey Crew JANSSEN Transect Number 1
Transect location .75 miles up road West of Poorman Pond Rd.



Map Reference _____

Vehicle Access Up Boulder Cr Road turn north up road on
East side of Poorman Cr. go .75 miles.

Photo Point Bottom of site looking upstream

Comments _____

STREAM PHYSICAL HABITAT DATA

STREAM POORMAN Cr. DATE 7/6/95 COLLECTORS JANSSEN

EPA REACH 17050123 025 LENGTH 284 ft STRATUM 1

TRANSECT 1 GRADIENT %/VERTICAL DROP 1.175 + 1.03 + .1 + 1.03 = 3.335 ft 1.2%

CHANNEL TYPES: (B) confined, flushing
C - meandered, depositional

PERCENT HABITAT TYPE: Pool 48% Riffle _____ Run/Glide _____ Pocket Water _____

COMMENTS (about anything instructive...vegetative cover, bank stability, etc.) Good stability & well shaded

Transect Length from Bottom	(ft) Width	Location on transect (l to r)	(ft) Depth	.64 ft/sec Velocity (run only)	Percent Substrate Class by Area				
					Sand	Gravel	Rubble	Boulder	Bedrock
0	8'	1/4	.6		100				
		1/2	1.0		50	50			
		3/4	.35		100				
90'	6.3'	1/4	1.06		100				
		1/2	.85			100			
		3/4	.60		100				
180'	5.8'	1/4	1.02		50	50			
		1/2	.70			100			
		3/4	.46		50	50			
284'	5.4'	1/4	.60		100				
		1/2	.65		50	50			
		3/4	.70		50	50			

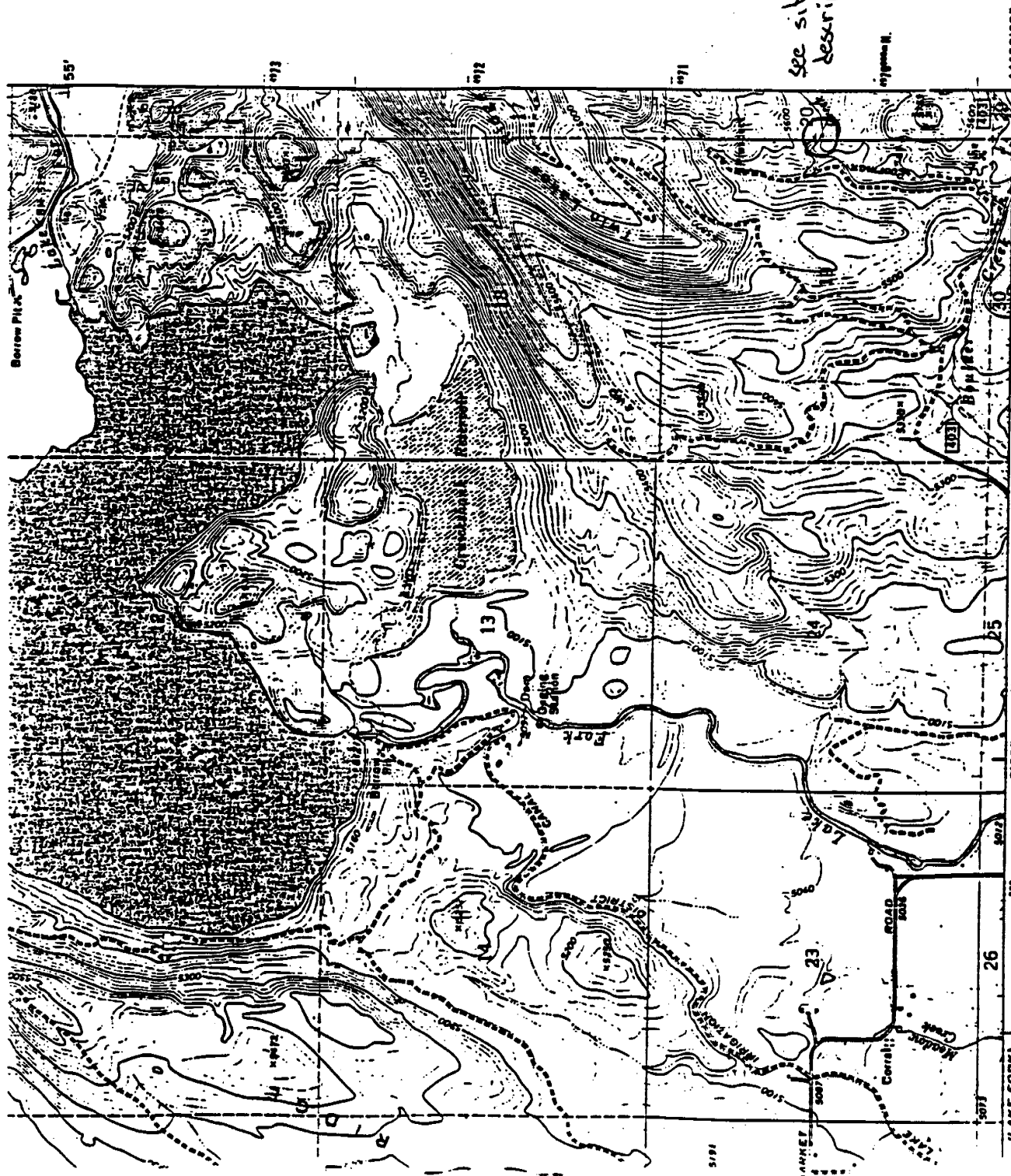
Appendix C. Continued.

DATE 7/6/45 SAMPLE CREW LEADER JAUSSEN

Length range	Section <u>1</u>				Species			
	Species				Species			
(mm)	BKT	BUT			(mm)			
					320-329			
					330-339			
					340-349			
50-59	l	l			350-359			
60-69					360-369			
70-79	l				370-379			
80-89					380-389			
90-99					390-399			
100-109	l				400-409			
110-119					410-419			
120-129	l	l			420-429			
130-139	l	l			430-439			
140-149	ll				440-449			
150-159					450-459			
160-169					460-469			
170-179	l				470-479			
180-189					480-489			
190-199					490-499			
200-209					500-509			
210-219					510-519			
220-229					520-529			
230-239					530-539			
240-249					540-549			
250-259					550-559			
260-269								
270-279								
280-289								
290-299								
300-309					Number			
310-319					Tot.Wt.			

Other Species Sampled _____

see site
description



IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEYS

FISH SURVEY DATA

Stream Tyndall Date 8/15/95 Survey Crew Brunton / Ison

Agency: Idaho Department of Fish and Game

IDFG Region: (circle your region) R-1, R-2, (R-3), R-M, R-4, R-5, R-6, R-7

Stratum 1 Transect 1

Channel Type: (B), C, Other Section Type: monitoring, chinook sup.,
steelhead sup., evaluation

Quad Map ITD-Pistol Cr. UTM x/y _____

EPA Reach # 17060208 02 041

Length 284 ft Transect Widths 9.5, 15.8, 9.1, 9.1 (ft)

H₂O Temp. 45°F Time 1430 Mean Width 10.87 (ft)

Conductivity _____ μ S Transect Area 3088.5 ft

Corridor visibility _____ m

Methods: () Snorkel (circle corridor or entire stream width)
(☒) Electrofish
() Other _____

Habitat Type: (circle one) Pool, Riffle, Run/glide, Pocket Water

IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEY

TRANSECT DESCRIPTION SHEET

Stream Tyndall Cr. Date 8/15/95
EPA Reach Number 17060208 02 091 IDFG Region 3 McCall
Survey Crew Brunton / ISON Transect Number 1
Transect location Approx 1 mi past Stolle Meadows Ranger station.
Walk through meadow cross SFSR, stream comes out of
visible valley. Transect starts where stream exits the
woods.



Map Reference _____

Vehicle Access Take FS Road 474 go past Stolle Meadow
Ranger station (approx 1 mile). Park and walk through meadow
cross SFSR. Tyndall comes in from visible valley

Photo Point Looking upstream from bottom of transect

Comments _____

STREAM PHYSICAL HABITAT DATA

STREAM Tyndall Cr. DATE 8/15/95 COLLECTORS Brunton/TsonEPA REACH 17060208 02 091 LENGTH 284 STRATUM 1TRANSECT 1 GRADIENT %/VERTICAL DROP 2.1 + 2.5 + .8 = 5.4 ft.CHANNEL TYPES: (B) confined, flushing
C - meandered, depositionalPERCENT HABITAT TYPE: Pool 5% Riffle 60% Pocket Water 35%COMMENTS (about anything instructive...vegetative cover, bank stability, etc.) Bank stability fair & plenty of vegetation and woody obstructions.

Transect Length from Bottom (ft)	Width (ft)	Location on transect (l to r)	Depth (ft)	Velocity (run only)	Percent Substrate Class by Area			
					Sand	Gravel	Rubble	Boulder
0	9.5	1/4	.4	.74 ft/sec	50	50		
		1/2	.5		50	50		
		3/4	.3		50	50		
90	15.8	1/4	.5		100			
		1/2	.2		50	50		
		3/4	.9		100			
180	9.1	1/4	.5		80		20	
		1/2	.5		100			
		3/4	.2		100			
280	9.1	1/4	.7		80		20	
		1/2	.2		100			
		3/4	.4		100			

Appendix D. Continued.

DATE 8/15/95 SAMPLE CREW LEADER BRUNTON / TSON

Length range	Section <u>1</u>				Species			
(mm)	RST				(mm)			
					320-329			
					330-339			
					340-349			
50-59					350-359			
60-69					360-369			
70-79					370-379			
80-89					380-389			
90-99					390-399			
100-109					400-409			
110-119					410-419			
120-129					420-429			
130-139					430-439			
140-149					440-449			
150-159					450-459			
160-169					460-469			
170-179					470-479			
180-189					480-489			
190-199					490-499			
200-209					500-509			
210-219					510-519			
220-229					520-529			
230-239					530-539			
240-249					540-549			
250-259					550-559			
260-269								
270-279								
280-289								
290-299								
300-309					Number			
310-319					Tot. Wt.			

Other Species Sampled _____

IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEYS

FISH SURVEY DATA

Stream Lodgepole Cr Date 8/15/95 Survey Crew Brunton / Ison

Agency: Idaho Department of Fish and Game

IDFG Region: (circle your region) R-1, R-2, (R-3), R-M, R-4, R-5, R-6, R-7

Stratum 1 Transect 1

Channel Type: (B), C, Other Section Type: monitoring, chinook sup.,
steelhead sup., (evaluation)

Quad Map ITN - Pistol Creek UTM x/y _____

EPA Reach # 17060708 02 094

Length 284' Transect Widths 8, 15.3, 12.8, 19.3

H₂O Temp. 46°F Time 1200 Mean Width 13.85 ft

Conductivity _____ μ S Transect Area 3433.4 ft

Corridor visibility _____ m

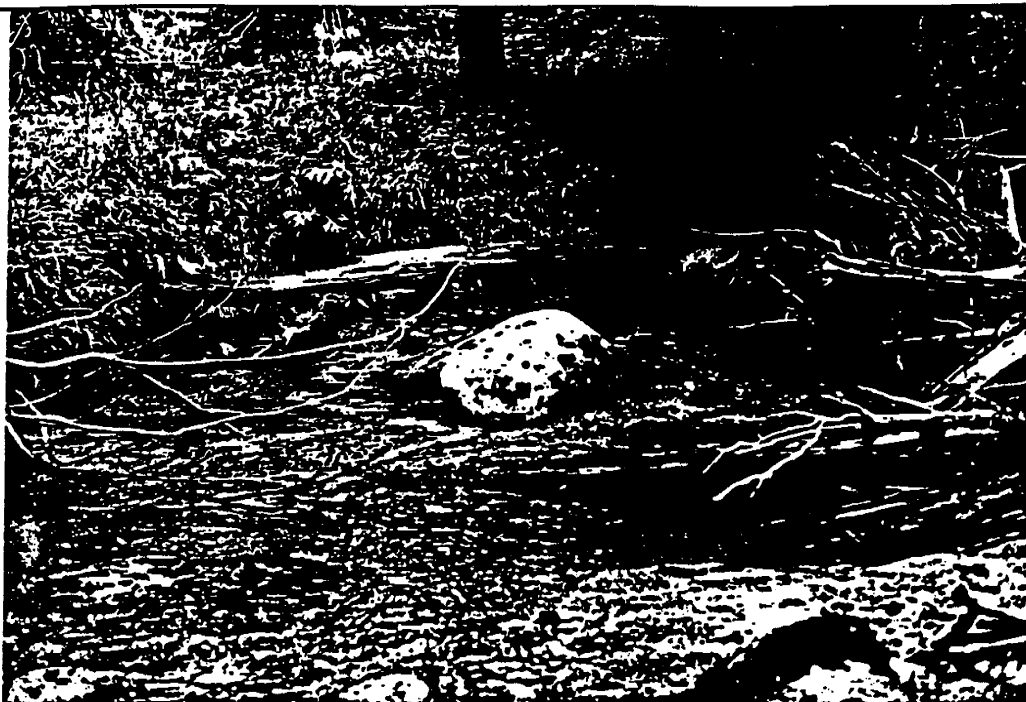
Methods: () Snorkel (circle corridor or entire stream width)
(☒) Electrofish
() Other _____

Habitat Type: (circle one) Pool, Riffle, (Run/glide), Pocket Water

IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEY

TRANSECT DESCRIPTION SHEET

Stream Lodgepole Cr. Date 8/15/95
EPA Reach Number 17060208 02 094 IDFG Region 3 McCall
Survey Crew Brunton/Ison Transect Number 1
Transect location Approx 1 mi on FS Road 472, Campground on right. Transect starts approx 284 ft downstream from colvert.



Map Reference _____

Vehicle Access Take FS Road 474 towards Stolle Meadows.
Take A left on FS Road 472, go approx. 1 mi until you
come to a Campground. Transect is downstream from colvert

Photo Point Looking upstream from bottom of transect

Comments _____

STREAM PHYSICAL HABITAT DATA

STREAM Warm Lake Cr. DATE 7/12/95 COLLECTORS JANSSEN

EPA REACH 17060208 01 037 LENGTH 284 ft STRATUM _____

TRANSECT 1 GRADIENT %/VERTICAL DROP .76 + 1.15 + .4 + .63 = 2.94 ft 1.0%

CHANNEL TYPES: ☒ confined, flushing
☐ meandered, depositional

PERCENT HABITAT TYPE: Pool 52% Riffle _____ Run/Glide 48% Pocket Water _____

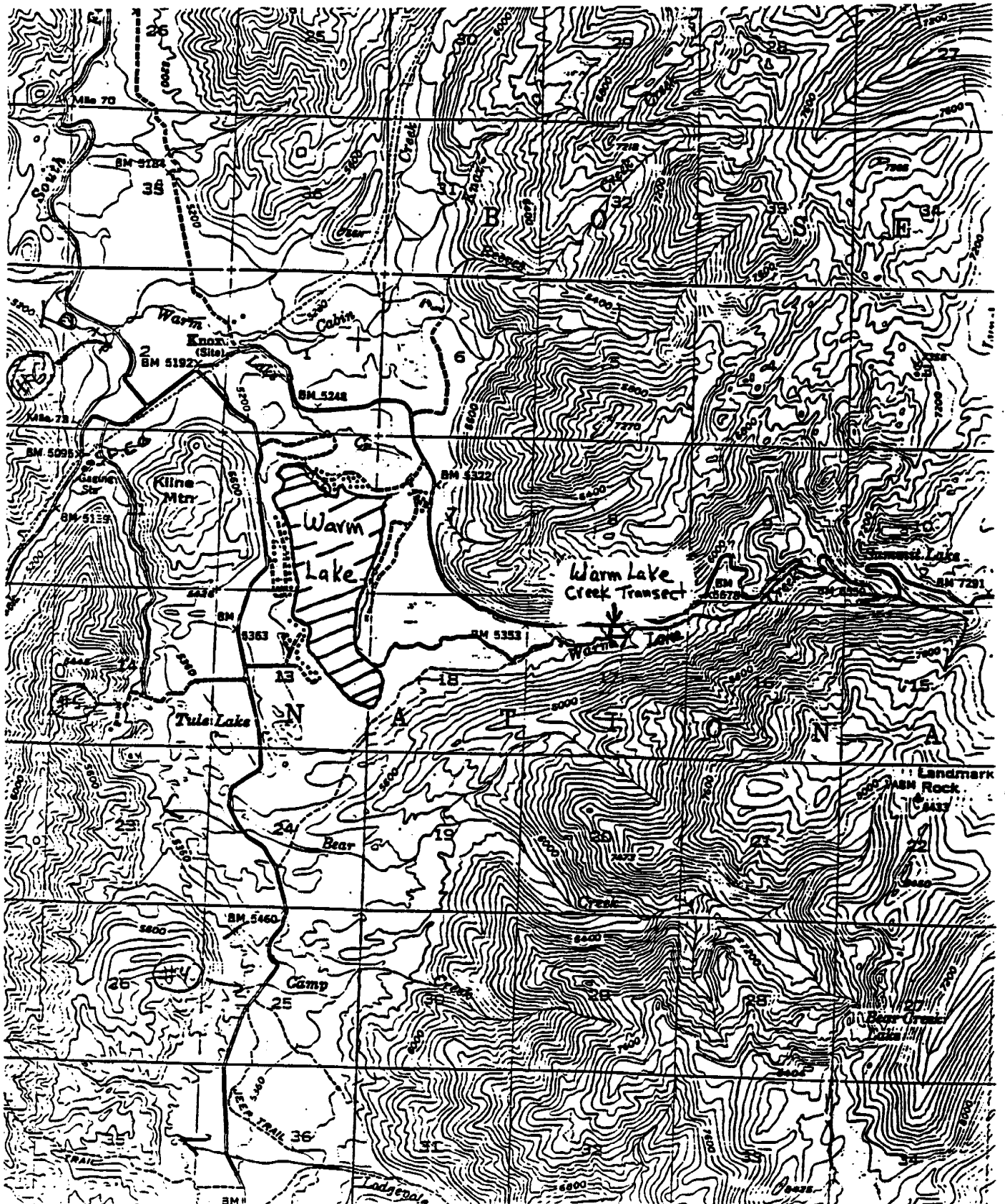
COMMENTS (about anything instructive...vegetative cover, bank stability, etc.) Abundant amount of vegetation cover and woody obstructions. The bank was somewhat stable with some erosion and undercutting visible.

Transect Length from Bottom	ft Width	Location on transect (l to r)	(ft) Depth	1.89 ft/sec Velocity (run only)	Percent Substrate Class by Area				
					Sand	Gravel	Rubble	Boulder	Bedrock
0	7.1	1/4 1.89	1.89			100			
		1/2 2.1	2.1			100			
		3/4 1.4	1.4		100				
90	10	1/4	.9		100				
		1/2	1.4		90		10		
		3/4	.7		100				
180	9.3	1/4	.5		20	80			
		1/2	.8		30	70			
		3/4	.8		20	70		10	
280	6.45	1/4	1.15		60	20	20		
		1/2	1.1		80		20		
		3/4	.7		10		90		

DATE 7/12/95 SAMPLE CREW LEADER JANSSEN

Length range	Section <u>1</u>				Species			
(mm)	Species				(mm)	Species		
	<u>BKT</u>							
					320-329			
					330-339			
					340-349			
50-59					350-359			
60-69	<u>11</u>				360-369			
70-79	<u>THN 1</u>				370-379			
80-89	<u>THN</u>				380-389			
90-99	<u>11</u>				390-399			
100-109	<u>11</u>				400-409			
110-119	<u>11</u>				410-419			
120-129					420-429			
130-139					430-439			
140-149					440-449			
150-159					450-459			
160-169					460-469			
170-179					470-479			
180-189					480-489			
190-199					490-499			
200-209					500-509			
210-219					510-519			
220-229					520-529			
230-239					530-539			
240-249					540-549			
250-259					550-559			
260-269								
270-279								
280-289								
290-299								
300-309					Number			
310-319					Tot. Wt.			

Other Species Sampled _____



IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEYS

FISH SURVEY DATA

Stream Warm Lake Cr Date 7/12/95 Survey Crew JANSSEN

Agency: Idaho Department of Fish and Game

IDFG Region: (circle your region) R-1, R-2, (R-3), R-M, R-4, R-5, R-6, R-7

Stratum 1 Transect #1

Channel Type: (B) C, Other Section Type: monitoring, chinook sup.,
steelhead sup., evaluation

Quad Map ITD - Pistol Cr. UTM x/y 11T0608185 44° 38.387
7m4943834 115° 38.068

EPA Reach # 17060208 01 037

Length 284 (ft) Transect Widths 7.1, 10, 9.3, 6.95 (ft)

H₂O Temp. _____ Time 1700 Mean Width 8.3 (ft)

Conductivity 122 μ S Transect Area 2357.2 ft

Corridor visibility _____ m

Methods: () Snorkel (circle corridor or entire stream width)

(☒) Electrofish

() Other _____

Habitat Type: (circle one) (Pool), Riffle, Run/glide, Pocket Water

IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEY

TRANSECT DESCRIPTION SHEET

Stream Warm lake Cr. Date 7/12/95
 EPA Reach Number 17060208 01 037 IDFG Region 3 McCall
 Survey Crew TANSSON Transect Number 1
 Transect location At campground there is a primitive walking/hiking bridge. Approximately 10 feet upstream is where transect begins, it ends 704 ft upstream.



Map Reference ITD Pistol Creek

Vehicle Access East on NEH 22. Past Warm lake lodge. Go .4 miles past Church Camp small dirt road on the right, park at 'campground at the stream's edge

Photo Point _____

Comments _____

STREAM PHYSICAL HABITAT DATA

STREAM hedgepole Cr. DATE 8/15/95 COLLECTORS Brunton / Ison

EPA REACH 760208 02 044 LENGTH 284 ft STRATUM 1

TRANSECT 1 GRADIENT %/VERTICAL DROP 1.6 + 2 + 4 = 7.6 ft 7.6/284 = 2

CHANNEL TYPES: B - confined, flushing
C - meandered, depositional

PERCENT HABITAT TYPE: Pool 18.4% Riffle Run/Glide Pocket Water

COMMENTS (about anything instructive...vegetative cover, bank stability, etc.) BANK stability is good, lots of shade AND woody obstructions.

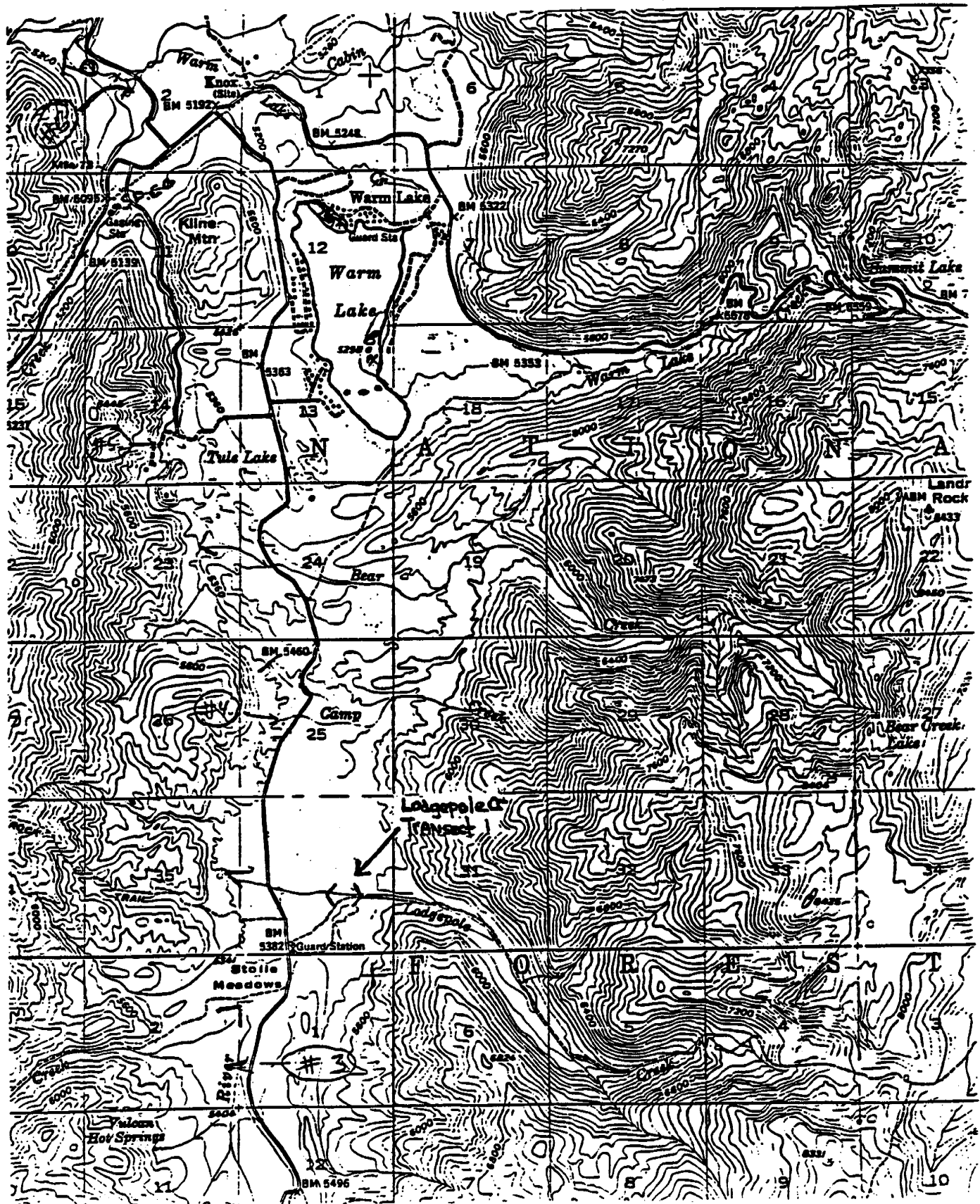
Transect Length from Bottom	(ft) Width	Location on transect (l to r)	(ft) Depth	.757 ft/sec Velocity (run only)	Percent Substrate Class by Area				
					Sand	Gravel	Rubble	Boulder	Bedrock
0	8'	1/4	.6		100				
		1/2	.7			50	50		
		3/4	.5			50	50		
90	15.3'	1/4	1.3		90	10			
		1/2	1.9		50		50		
		3/4	1.8		80	20			
180	12.8'	1/4	.7				100		
		1/2	.5					100	
		3/4	.7		100				
280	19.3'	1/4	.9		80			20	
		1/2	1.0		20			80	
		3/4	.8		100				

Appendix F. Continued.

DATE 8/15/95 SAMPLE CREW LEADER Rounton

Length range	Section <u>1</u>				Species			
	(mm)	BKT	RBT		(mm)	BKT	RBT	
					320-329			
					330-339			
					340-349			
50-59					350-359			
60-69					360-369			
70-79					370-379			
80-89					380-389			
90-99					390-399			
100-109			1		400-409			
110-119			1		410-419			
120-129			1		420-429			
130-139					430-439			
140-149					440-449			
150-159	1				450-459			
160-169					460-469			
170-179	1				470-479			
180-189					480-489			
190-199					490-499			
200-209					500-509			
210-219					510-519			
220-229					520-529			
230-239					530-539			
240-249					540-549			
250-259					550-559			
260-269								
270-279								
280-289								
290-299								
300-309					Number	2	3	
310-319					Tot. Wt.	86	51	

Other Species Sampled sculpin



1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fishery Management F-71-R-20

Project I: Surveys and Inventories

Subproject I-C: Southwest Region (McCall)

Job: d

Title: Salmon and Steelhead Investigations

Contract Period: July 31, 1995 to June 30, 1996

ABSTRACT

McCall Subregion salmon and steelhead investigations are incorporated in separate statewide reports. These reports include "Salmon and Steelhead Investigations," "Salmon Spawning Ground Surveys," "Idaho Supplementation Studies," and "Idaho Habitat/Natural Production Monitoring."

Author:

Don Anderson
Regional Fishery Manager

1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project II: Technical Guidance

Subproject II-C: Southwest Region (McCall)

Contract Period: July 31, 1995 to June 30, 1996

ABSTRACT

McCall Subregion fishery management personnel responded to more than 200 requests and opportunities for technical input. Comments were provided to state and federal agencies on proposed activities for which they have regulatory authority. Advice and technical assistance were provided to private businesses and the public on activities associated with fish, or having impacts on fish populations or fish habitat. The major topics of involvement included stream channel alterations, mining, and land management planning. We provided data and technical advice to an increased number of fisheries consultants.

We also gave presentations to schools, sports person groups, and civic organizations. We answered many questions from the angling public on fishing opportunities, regulations, techniques, and specific waters.

Author:

Don Anderson
Regional Fishery Manager

OBJECTIVES

1. To protect or minimize impacts to McCall area fisheries by providing technical fisheries input to government agencies with regulatory or land management authority.
2. To provide technical fisheries input, guidance, and advice to private entities and the general public.
3. To promote understanding of the environmental requirements of fish populations and appreciation of their values.

RECOMMENDATIONS

1. Continue to provide technical fisheries input to the entities which most affect fish populations.
2. Continue to provide technical guidance and advice to private interests and the general public.
3. Expand efforts to educate the public in the environmental requirements for fish.

RESULTS

The following (Table 1) lists the public and private entities and number of contracts and responses made for each during 1995.

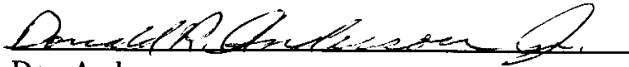
Table 1. Summary of technical guidance responses and activities by McCall Subregion fisheries management personnel in 1995.

Agency Or Individuals	Number of Responses	Agency Or Individuals	Number of Responses
U.S. Forest Service	33	Municipalities	4
U.S. Bureau of Land Management	4	Idaho Department of parks and Rec.	4
U.S. Environmental Protection Agency	6	Trout Unlimited	4
U.S. Army Corps of Engineers	11	Big Payette Lake Water Quality Council and TAC	5
U.S. Natural Resources Conservation Service	12	Columbia River Intertribal Fish Commission	1
U.S. Bureau of Reclamation	10	Idaho State Legislators	3
Idaho Department of Water Resources	11	Cascade Reservoir Restoration TAC	12
Idaho Department of Lands	18	Boise Cascade Corporation	6
Idaho Department of Health and Welfare/DEQ	11	Consultants	18
Idaho Department of Transportation	3	Universities	3
Idaho Outfitters and Guides Board	5	Northwest Power Planning Council	3
Health Districts	2	Oregon Department of Fish and Wildlife	5
Hydroelectric developers	2	Federal Highways	2
Private fish pond owners	18		
Public meetings and presentations	12	Total	254
Mining	7		
County Commissions	7		
U.S. Fish and Wildlife Service	9		
Bureau of Reclamation	3		
Nez Perce Tribe	6		
National Marine Fisheries Service	11		
Municipalities	4		

Submitted by:


Approved by:

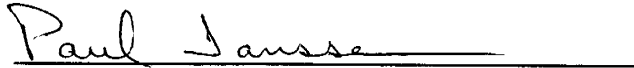
IDAHO DEPARTMENT OF FISH AND GAME



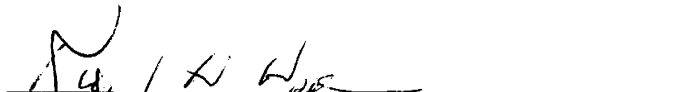
Don Anderson
Regional Fishery Manager



 Tracey Trent
Regional Supervisor



Paul Janssen
Regional Fishery Biologist



Kim Apperson
Regional Fishery Biologist